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EDITORIAL.

In the first article, Mr. Browne attempts to set forth what, if he had followed Mr. Bucke's nomenclature in his article in the last number on the dog—or cyno-psychoses, might have been called by the somewhat imposing and onomatopoetic term, ailouro-psychosis, or cat psychology. He brings out important pedagogic and psychological, as well as culture historical points. As a doll, pet, companion, the cat has its place and the phylogenetic implications are of especial interest. The pubescent change of attitude and feeling is marked.

The next article is an important contribution to the psychology and especially the pedagogy of English, showing how word and concept developed together. The author's many curves show the age from eight to twelve to be of special importance.

The article on foods is the result of an unusual amount of counting and tabulation and shows new relations between ontogeny and phylogeny, hunger and satiety and their signs, the number of things tasted and actually eaten in the experimental stage, the effects of teething, chewing, munching, nibbling, the disagreeable things experimented with, the mixtures, the five stages in the development of appetite, the progressive discrimination and widening interests, the alternation from fruits and vegetables to meats, forcing the appetite,—the effects

of the æsthetic appearance of food, etc., are stated directly from the data. The author has wisely and with great temperance refrained from all the many theoretical inferences with which the field abounds, reserving these for later treatment.

The last article describes a school which no longer exists, but which attempted with a gratifying degree of success a number of most wholesome departures.

The first few book reviews are of important new books and are by Dr. Theodate L. Smith, and the usual book notes follow.

THE CAT AND THE CHILD.

By G. Stanley Hall and C. E. Browne.

This study was made with aid given by the Carnegie Institution.

The present study, while a unit in itself, is also one in a series of studies recently made at Clark University, of children's reactions to plant and animal life, clouds, the sun, moon, atmospheric conditions, light and darkness. It is not a study in comparative psychology, and the character and habits of the cat, its semi-wild state, its instincts moods and activities are considered only in so far as these relate to the rôle which it has played in the history of the human race from the time of its worship in Egypt to the domesticated pet of our own day.

Biologically considered, the cat belongs to a large and important family, the Felidae, of the order Carnivora or flesh eaters. Modern classification, which is based principally upon the characters of the bony skeleton, divides the carnivora into three suborders,[1] the Cynoidea, represented by dogs, wolves, foxes and jackals; the Arctoidea: bears, raccoons, otters and most of the fur bearing animals; the Aeluroidea, comprising four families of which the Felidae or cat family is by far the most important.

The Cat in Geology. A passing glance at some of the traces of primitive Felidae and its ancestors, so far as they have been geologically determined, will indicate somewhat the lines of its evolution and differentiation from the other three families of the Aeluroidea. The family of the true cats is of comparatively recent origin. It is certain that they existed during the Pliocene epoch, and it is very probable that they have been found in the Upper and Middle Miocene. There is some reason to suppose that the family dates from the Upper Eocene epoch (phosphorites). More than fifty species of extinct cats, some of them fourteen feet in length, have been unearthed. These fossil cats occur in nearly all of the great regions of the world. The oldest cats of Europe and North America make their appearance in geological history apparently at nearly the same time. Nowhere have extinct cats been found in greater variety and abundance than in the United States, and it is not improbable that here is the birthplace of the family.

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[1] Huidekoper, R.: The Cat, pp. 1-20. See also his Bibliography, p. xi.

Going still further back, the Eocene epoch shows many traces of flesh eaters which may well have been the ancestors of the Felidae. According to Cope[1] "this position is most appropriately held by the Oxyaenidae, a family of several genera, which included the most formidable rapacious mammals of that early period in both continents." In the process of evolution the muscles of the jaws and the teeth have moved forward, at the same time the jaw has become shorter. This has resulted in bringing the power of the jaws to bear more prominently on the canine teeth. In the early carnivora, the jaws are much longer and support a larger number of teeth than in any of the modern families, and the fissure of the mouth was probably very wide and the last molar, a sectorial, while the canine teeth were evidently very ineffective as weapons. These animals probably only snapped with their jaws and did not attempt to lacerate, or hold on as is so characteristic of the cat family. The dogs of to-day are an example of the long jawed type. They snap in a manner quite distinct from anything seen among cats. In the use of the canines for tearing, lacerating and holding on, which has evolved along with the shortening of the jaw, we have derived one of the most typical characteristics of the Felidae.

Such are a few of the scattered traces of its ancestry and evolution which the Felidae of our day have left behind. Leaving now the Felidae in general, and coming to the domestic cat, a glance at its anatomy is significant of its habits.[2]

Anatomy of the Cat. The human skeleton resembles that of the cat. It is composed in general of the same bones bearing the same names and exhibiting the same features. It varies a little in the relative proportions of its parts and in a few minor details of structure. The most striking difference between the two skeletons is due to the upright posture of man's body, the shortening of the trunk, the flattening of the thorax, the broadening of the pelvis, the straightening of the leg, and the flattening of the foot.

Professor Mivart ranks the cat among the best structurally equipped of the carnivora. "Feeding upon other animals, which it must pursue with noiseless stealth and capture by an exertion of supreme activity, the cat has padded feet which make

[1] Cope, E. D.: Extinct Cats of America. Am. Naturalist, Vol. XIV, p. 839, also Cope, Genera of the Credonta. Proceed. Am. Phil. Soc., July, 1880.

[2] Chauveau, A.: The Comparative Anatomy of the Domesticated Animals; Wilder and Gage: Anatomical Technology as applied to the Domestic Cat; Gorham and Tower: Laboratory Guide for the Dissection of the Cat; Jayne, H. F.: Mammalian Anatomy, Vol. I, p. 102; Mivart, St. G.: The Cat. An Introduction to the Study of Backbone Animals; Reighard and Jennings: Anatomy of the Cat.

no sound in movement; muscles of enormous power and bulk in proportion to its size, and attached to bones adjusted to each other at such angles as to form the most complete system of springs and levers for propelling the body known in the whole group; the claws are sharper and curved into strong hooks more than in any other mammal, and by the action of special muscles are withdrawn under the protection of sheath like pads, that they may escape wear and injury when not in use. No teeth are better fitted for their work— the great canines for tearing, and the scissors-like premolars for shearing off lumps of flesh small enough to swallow. In the eye, the fibres of the iris, opening to the widest extent, expand the pupil to a full circle, admitting the darkness of night, and by a rapid and spontaneous contraction—in some species to a narrow slit, in others to a ring as small as a pinhead—shut off all excess of blinding light at midday, and permit minute exactness of vision under either extreme."

The small lung area allows of quick, active movement, but not of prolonged work. The short and simple alimentary tract, lacking the intestinal constrictions found in many of the higher animals, takes up little internal space, and permits of a lithe and slender form suited to the highest activity, at the same time performing its digestive work rapidly, and soon ridding the animal of the burden of the enormous meals such as animals, which feed only when they can, are certain to indulge in.

The shoulder-blade, the arm, and the fore-arm lie at very close angles, as do also the thigh, leg, and foot of the hinder extremities. The enormous jumps which the cat is capable of taking are due to the great power and the closed angles of the joints of its legs; whereas the stride of the animal at a walk, or a trot, is very limited. Adding to these structural adjustments, the fact that the external coloring of wild cats is highly assimilative, or suited for concealment among the various shades of ground and foliage, it is probable that no other animal is better armed for the battle of life than the cat.

Historical Sketch. The first evidence of the cat in connection with man is found in the ancient monuments of Egypt, Babylonia, and Nineveh. The earliest known tablet dates from the Eighteenth or Nineteenth Dynasty. A temple at Beni-Hassan dedicated to Bubastes or Pasht,[1] the cat goddess belongs to the period of Thothmes IV of the Eighteenth Dynasty, 1500 B. C. To the Egyptians the cat was an emblem of the sun.[2] Its eyes were supposed to vary in appearance with its course, and also

[1]De Forest, J. W.: Atlantic Month., Vol. XXXIII, pp. 556, *et. seq.* Also see, Budge, E. A. W.: The Mummy. Cambridge, 1893.

[2]Huidekoper, R. S.: The Cat, p. 36. See also his Bibliography, p. xi.

to undergo a change each month, on account of which the cat was sacred to the moon. The persea tree, supposed to mark the place of the sun's rising on a mid-summer day, is connected in the 17th chapter of the Book of the Dead with a great cat, called by Ra, the chief god.[1] The idea of a "great cat" is enlarged upon by Neville who holds that very likely the holy cat of Bubastes was not the ordinary domestic cat, but some larger animal, either a wild cat or a kindly lynx.[2] Herodotus considered the Bubastes of the Egyptians as synonymous with the Greek Artemis or Diana, generally regarded as a moon goddess. The three forms of Hecate,[3] also, according to Herodotus, were regarded as forms of the cat goddess, the divinity of the intercalary festival month of the 120th year, which was necessary to again bring the calendar into harmony with nature and "the will of the gods." "The Great Cat" of Egypt, goddess of the extra month, is also associated with Artemis by Plutarch who makes mention of an old tradition to that effect. Thus it would appear that the Roman Diana, the Greek Artemis and the Egyptian Pasht or Bubastis had a common origin connected with the worship of some animal. At least in these goddesses we seem to have a distant echo of the very early worship of some large, possibly a wild animal, connected with the moon and the chase, which preceded cat worship. Sayce thinks that this animal was probably the lion, as the earlier inhabitants of the Nile were acquainted with lion. Cats were probably introduced into Egypt from Nubia during the period of the Eleventh Dynasty, and the lion of Sikhit, in the course of time, was transformed into a cat, whose worship later became fanatical.[4]

The cat's first appearance in the Chinese Empire is supposed to have been as late as 400 A. D. It is described "a catcher of mice and a slayer of hens." In India the house cat was also known from a very early period and it was called by a number of composite names, signifying rat-eater, mouse-enemy, etc. It also figures in some of the oldest Indian fables,[5] "always as an arrant hypocrite, fair spoken and full of guile." No mention of the cat appears in Greek literature until Theocritus,[6] 325 B. C. Coming also late to Rome, the cat became the symbol of liberty and its image was placed in the Temple of Liberty by Tiberius Grachus. In the mythology of Northern and Central Europe the cat also occurs. The car in which the goddess, Freya, took her journeys is fabled to have been drawn

[1] St. Clair, G.: Gentleman's Mag., Vol. CCXC, pp. 251.
[2] See Neville: Bubastis. (Egypt, Exploration Fund.) Vol. I, pp. 40, *et. seq.*
[3] See Smith's Dict. of Class. Antiq.
[4] Sayce, A. H.: The Religions of Egypt and Babylonia, pp. 144, *et seq.*
[5] Cited by A. Repplier. Fireside Sphinx.
[6] De Forest, J. W.: Atlantic Monthly. Vol. XXXIII, p. 556, *et. seq.*

by cats or leopards. In Northern Europe, especially in the British Isles, the wild cat was common up to comparatively recent times. Dawkins[1] concludes from his explorations in the caves in which the Celts took refuge from the Saxons, that cats were unknown in Great Britain before 800 A. D.

Throughout its long history as a domesticated animal, the cat's services to man, of a material kind, have been slight. In some very early wall paintings of Egypt a cat is represented as bringing either fish or game to its master sitting in a boat, which would seem to indicate that with the early Egyptians, cats were used for retrieving as well as keeping down rats and mice in their granaries. In California, within recent years, cats have been trained to catch the gopher, a species of burrowing, pouched rat, very destructive to gardens and fields generally.[2]

"In the time of Hoel, the Good,[3] King of Wales, who died in the year 948, laws were made as well to preserve as to fix the different prices of animals; among which the cat is included, as being at that period of great importance, on account of its scarcity and utility."

The imaginary uses of the cat have been far greater than the actual, especially in medicine,—mediæval literature furnishing abundant evidence of the superstitions in this respect. Some of these cures are very curious and evidently connected with a belief in the supernatural powers of the cat. A cure for erysipelas[4] was to cut off a cat's ear and let the blood drip on the affected part. A recipe for preserving the eyesight was to burn the head of a black cat to ashes and have a little of the dust blown into the eyes three times a day. A whitlow could be cured by placing the affected finger a quarter of an hour each day in a cat's ear, and the fat of the wild cat was considered a remedy for epilepsy and lameness.[5]

While the cat is no longer an object of worship, and the superstitions of mediæval times have dwindled to a few luck signs, the cat has, in recent years, become the object of much interest and cat clubs and cat shows, in both England and the United States, have rapidly increased during the last fifteen years. These clubs are chiefly concerned with the breeding of long-haired and fancy varieties of cats, but they have also been instrumental in establishing homes for sick and stray cats with departments for boarding pet cats in the absence of their owners. In connection with the Beresford Cat Club, of Chicago, there is a children's cat club which has for its object the teaching of

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[1] Larrabee, W. H.: Pop. Sci. Mon., Vol. XXXVII, p. 91.
[2] Lord, J. K.: Leisure Hour, July, 1867.
[3] Boswick's Quadrupeds (cited by Weir, p. 166).
[4] Henderson, W.: Folk Lore of the Northern Countries, p. 149, *et. seq.*
[5] Ross, C. H.: Book of Cats, pp. 60-63.

kindness to animals by awakening in them an appreciative love of cats.

In France, cats have met with less favor than in England and the United States, but there is a growing interest in them, and cat shows have become a regular feature of the Jardin d'Acclimation.

That an animal whose characteristics have so impressed themselves upon man from the earliest historic times that it has been regarded as an object of worship, reverence, fear, love, hate and superstition should often prove an important factor in the psychic life of children is to be anticipated, and this the data of returns clearly show.

The material on which this study is based was collected chiefly from school children in answer to the following set of questions. To these were added a few returns from normal school students who were asked to write on their favorite pet animal. In all cases the animal written upon was the free choice of the writer.

(1) Why they preferred it to others; how they got it; how long it was kept.
(2) What it could do, its brightest thing; can it talk, understand or obey your language; what did you think or imagine it says?
(3) What games, if any, do you play with it or does it prefer; does it sing, make music, or read?
(4) Was it ever ill, and if so what did you do for it, and was it appreciative?
(5) Is it bad and what do you do then; does it know right and wrong; is it ever sorry, happy, cross?
(6) Does it (a) scold, (b) swear, (c) pity, (d) run away, (e) fight? Give instances.
(7) Give its names and tell how they were received; christening.
(8) Do you tire of or forget it, why? do you love it; does it love you? Proofs of affection.
(9) Its health, exercise, sleep; what is its food and how fed?
(10) How do you and it feel when separated and upon return? Proof that it misses you.
(11) Did the pet do you any good and what? State anything else of interest about the pet.
(12) What became of it at death; how did or will you dispose of it at death?

The total number of returns on different animals, collected chiefly by Dr. W. Fowler Bucke, was 2,835. Of these, 1,655 were from females and 1,180 from males. 804, or 28.4%, were reports on cats. Of these 804 reports 222 were from males and 582 from females. In 643 of these, ages were given, and in the remaining 161 are included the reminiscent returns chiefly from normal school pupils of ages averaging from eighteen to twenty-five. For convenience these two classes of returns have been designated A and B and are so used throughout the paper wherever a statistical statement is of interest though the qualitative value of the returns is of far greater importance. The

child's own expression of his interest, his enthusiasm, indifference and emotions cannot be adequately expressed by any system of classification.

The reasons given for liking the cat as a pet fall mainly into the following groups, arranged in the order of preference.

Girls: playing qualities, 26%; catching mice and rats, 12%; because it is good, 10%; gentle, does n't scratch, bite or bark, 10%; because it is pretty, 10%; companionship, 10%; had it so long, 4%; because it is soft, 2%; because it is mine, 2%; intellectual qualities, 2%; because it purrs and sings, can nurse and feed it, is nice, alive, runs and climbs, each 1%.

Males: Playing qualities, 22%; catching rats and mice, 14%; gentle, kind, does not bite, 12%; looks pretty, 12%; because it is nice, 10%; intellectual qualities, 8%; because it is my cat, 6%; companionship, 5%; because it is good, 5%; memories of previous pet, 4%.

The manner in which children have obtained pet cats brings out certain phases of the child's mental and emotional life which are perhaps best illustrated from the child's own words.

F., 12. "When I was six years old, my sister and I were coming home from the store, when we met a couple of boys. One of the boys had a little kitty and he was letting it go as far as it would and then pulling it back by the tail. I asked him to give it to me and he did, so I took it home"

F., 13. "I was walking along and a cat came up to me crying. It looked very cold and I took pity on it and took it up in my arms and carried it home."

M., 12. "I have a cat and I like him because he plays with me. I found my cat in the street and I brought him in my house and made him my pet."

M., 13. "I like my pet better than any other cat because she kisses me. I got it for a present and I have it yet."

M., 12. "I have a cat. I like it because it is my pet. My mother found it on the street and brought it home a year ago."

The following table summarizes the ways in which cats have come into the children's possession.

	Boys		Girls	
	A.	B.	A.	B.
Given to me,	49%	34%	46%	66%
Came to us,	19	8	23	2
Bought or otherwise procured,	11	30	11	9
Found it,	10	26	8	12
Raised it,	8		4	8
Followed me home,	1		3	1
Rescued it,			2	

Two facts are brought out clearly in this connection; the child values the cat because it is his own, and nearly one half of the cats mentioned in the returns have been homeless and have been rescued and adopted by the child. The two factors of ownership and pity or sympathy are very nearly equal, with

the former slightly in the lead. The psychology of ownership[1] can be traced far back in the animal series and the instinct is exceedingly strong in the child, as has been shown by many investigators.

According to Groos[2] the gathering among children is modified and directed to the acquiring of things upon which they can exercise their own motor apparatus. The child's first experience with things is thus mainly co-educational of the sensorium and in muscular co-ordination. In the child's exercise of his motor apparatus imitation comes to play a prominent rôle giving color and range to the manipulation of inanimate objects and is an inseparable part at least, if not the explanation of his anthropomorphic tendencies. With the boys these anthropomorphic tendencies are more often mechanical[3] and constructive; with girls more often humanistic. When the motor apparatus becomes directed to a living animal, the range of anthropomorphic possibilities becomes much larger. Less now is left to the imagination of the child. His ownership now passes to the control of an extra centre of activity, purpose and will. He becomes the law giver. All the humanistic qualities projected into inanimate objects, in the living animal have a real basis. This tinge of reality is of the greatest educational advantage for the pseudo-mature, practical character of the child.

Concerning the second factor in the child's acquisition of the cat; namely, its domestication, very little is known as to how this was first accomplished in our most commonplace animals, the dog, the horse, the cow, etc.

Tradition and myth offer many ingenious explanations, but scientifically as to the when, the where, and how domestication took place, we are in the dark. The significance of domestication; the rôle it has played in the evolution of civilized man is inestimable, as Professor Shaler[4] and others have well shown. We are able also to read from the bones of our most common domestic animals, in the strata of earth the stages they have passed through along with the ancestors of man in the process of evolution. Reading backward from the present forms of these creatures, we can see how the artificial selection of useful qualities by man has varied primitive structure and disposition. All this we know with comparative exactness, but it fails to throw much light on the question of man's first friendly relations with animals.

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[1] Kline and France: The Psychology of Ownership, *Ped. Sem.*, Vol. IX, p. 327.

[2] Groos, K.: Spiele der Menschen, p. 90, *et seq.*

[3] See "Curiosity," *Ped. Sem.*, Sept., 1903, by G. Stanley Hall and Theodate L. Smith.

[4] Shaler, N. S.: Domesticated Animals.

Over against the extreme utilitarian view of the first domestication of animals, Dr. Chamberlain[1] has suggested another, or at least a modification; namely, that the first animals to be domesticated, themselves took the initial step in the process. Certain animals found it advantageous to live near to and follow primitive man. They performed for him a service by removing for their own food the refuse of the hunt which he had thrown away. The wolf became a camp follower, because he found it for his advantage to do so and gradually became more dog like. The ancestors of the cat perhaps did the same thing; favored by woman who has domesticated her, the cat took her place almost uninvited, very likely, at the family hearth. In some such way as this, almost before primitive man relized the importance of what had taken place, the animal may have been already at his fireside, practically domesticated. The picture which Professor Chamberlain gives of what probably took place in man's first friendly relations with animals, is exactly the picture of the cats's relations with mankind to-day, and as far back as it can be traced. Best fitted of all the carnivora, as Mivart and others have shown, to lead an independent life, after thousands of years of association with man, still possessing unchanged its primitive character and structure, quickly and easily reverting to its wild state, attached more to places than dependent on individuals, as is the dog, the most useless to her host of all domestic animals, the cat still is the guest of man, because she finds it to her advantage and not because she must. If such a hypothesis applies to man's first domesticated animals, the child's partial domestication of the cat is very analogous.

The naming. In 83% of the returns the name of the cat was mentioned. 672 named cats were reported.

The larger part of these names were those of persons either friends or of some noted person, a few of these being given because of some fancied resemblance to the character of the person, but for the most part, the name was chosen either because the person to whom it belonged or the name itself was liked. Naming from color was common, as were also names indicating certain physical characteristics. Examples of these different types of names are

"Dewey, because he was a fighter." "Murphy, because I like that name." "Tony, because I knew a little boy of that name who was mischievous." "Nancy, after a cat that died." "Floss, after a girl I like." "Dirty-face, because his face is always dirty." "Mittens, because it has white feet."

The chief fact brought out by the naming is that children universally recognize the cat as a distinct individuality, and

[1] Lecture course—unpublished

many of the names are given for precisely the same reasons which we can trace in many of our most common family names. In primitive thought the name was often identified with the person or thing it represented and even became a separate entity with an existence of its own.[1]

A few instances of christening ceremonies in connection with cats are reported and though, doubtless, imitation plays a large part in these, they also emphasize the importance which the child attaches the name.

Activities of the Cat. The children's reports concerning things that a cat can do form the largest and most varied section of the subject. The activities reported range from the most trivial to the most marvelous, with every shade of differentiation between, all expressed with equal sincerity and candor. Anthropomorphisms stand out at every turn. The forms of activity which have most impressed the child are here given in the order of their numerical importance; the cat plays, catches mice and rats, jumps, sits, stands, lies down, chases or follows, climbs, scratches, bites. The first three of these activities, playing, catching rats and mice and jumping have much the largest per cent. of mentions and are described with the greatest detail. That the interest in the cat's hunting instincts should be more emphasized by boys than by girls is in accordance with other investigations along this line. Both boys and girls are impressed by the spontaneous play of the cat, its great variety and activity of movement of which they are passive spectators, the play of the child with the cat being quite a different phase of the subject.

The girls' sympathies seem somewhat broader as they extend to the mice, rats and birds which the cat catches, while the boys' are focussed on the success of the cat. The more highly specialized activities appeal more strongly to the girl. The fact of the cat's power to scratch and bite is mentioned in only a small per cent. of the papers. One very marked feature of the child's reaction to the general activities of his pet cat is the importance which he attaches to the most insignificant positions and actions; only a passing glance at the things which the child records with such exactness is required to demonstrate that the child is a most minute observer of movement and spatial position. The analogue of this phenomenon is very apparent in the large extant body of the most popular animal superstitions. With cat superstitions, only in a relatively small degree does color—as the black cat with her powers for good or ill play a part. The part that number plays is also comparatively small. The most essential elements appear to be insignificant actions

[1] Sayce, A. H.: Religions of Ancient Egypt and Babylonia, p. 219.

and positions to which are attached great importance. If this class of superstitions is typical, the race, at least the race at the stage of development where superstitions of this class had their birth, is also a minute observer of motion and position.

Two factors have probably played the principal rôle in leading up to this class of superstitions. First, man with his long training as an arboreal creature, in escaping from more ferocious animals needed keen powers for observing the slight movements of his enemy concealed by the foliage and its own markings. Quite possibly this power of perceiving very slight movements, if we are warranted in postulating the existence of such a power, was one of the prime survival factors of our anthropoid ancestors. The keener vision of the savage for detecting concealed animals, and fish swimming in streams and lakes, may be due to a like keenness of vision for slight movements.

Ferrari, after a series of careful[1] observations, comes to the conclusion that the so called thought-reading is to be explained as an extreme delicacy of vision for slight mimetic movements which, according to the well established law that all thought tends to express itself in motion, are always taking place, though imperceptible to the keenest normal observer.

Hardly less imperative for the survival of our arboreal ancestors must have been the quick and accurate estimation of distance and position in the enormous jumps at great heights from limb to limb, or tree to tree; and for which the monkey tribe are still noted.

Besides its use in escaping from enemies, a second characteristic which tended to perpetuate and fix this keenness of vision for slight movements and spatial position, was the great fact of animism; endowing all movement with the soul, intelligence, and purpose.

It is from such soil as this that superstitions after the manner of the few examples here given spring:[2]

"Thrice the brindle cat has mewed,"[3] significant of evil about to befall the household.

If a cat chanced to jump over a coffin, she must be immediately killed, or great misfortune was sure to follow.

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[1] Ferrari, J. C.: La Divination de la Pensée, Rep. 4th International Congress of Psychology, Paris, 1901.

[2] Collected by Weir, H. (Our cats); Lawrence, R. M. (The Magic of the Horseshoe); Henderson, W. (Folklore of the Northern Countries) and others, principally from Hone, "Every Day Book," Vol. I; Dyer, T. F. T., "English Folklore;" Milton, "Astrologaster;" Erasmus Darwin, "Signs of Foul Weather;" Herrick's "Hesperides;" John Shaw, "Speculum Munde" (Cambridge, 1643); Harland and Wilkinson, "Lancashire Folklore;" Edwards's "Old English Customs;" Bourn and Brand's "Popular Antiquities," etc.

[3] Shakespeare: "Macbeth," Act IV, Scene 1.

If a cat sneezed on a wedding day she brought good luck to the bride.

The cat "useth therefore to wash her face with her paw, and it is observed by some that if she put her feet beyond the crown of her head in this kind of washing, it is a sign of rain."

If a kitten comes to a house in the morning, it is lucky; if in the evening, it portends evil of some kind, unless it stays to prevent it.

If a cat tears at cushions, carpets, etc., or is generally uneasy and runs about, she is raising a wind. Hence the expression, "Busy's a cat in a gale of wind." This superstition is still widely prevalent in seacoast towns, on Cape Cod, and elsewhere.

In this connection it is interesting and significant to find that the child is still attracted and charmed by the most commonplace and insignificant movements of his pet. And any position it takes, whether lying, standing, or sitting is a center of interest.

The fighting qualities of the cat are an important consideration with boys and much less so with girls. With the boys, fighting is not only more frequently mentioned but is generally glorified as a feline accomplishment of high order. Girls are somewhat interested in cat fights, but from a different point of view; pity and sympathy for the one worsted often leading to a rescue, while the boys sympathize with the victor. With boys, interest in cat fights increases from eight to fifteen and decreases in girls of the same ages, as is shown by the following table:

Ages	8	9	10	11	12	13	14	15
Boys	37%	12	27	36	31	40	46	60
Girls	30	24	18	26	21	19	21	14

The attitude of the children toward cat fights is best brought out by quotations from the returns.

M., 14. "He often fought with other cats but probably on account of his size, he was generally victorious."

F. "I can remember its fighting but once and that was in self defence. A dog came in the yard and we had a box outside for the cat and the cat was in the box. The dog came by the hole in the box and began to worry the cat, and the cat fought in its own defence."

F. "Sometimes he would be gone two or three days. When he came back he would be all battered up from fighting. A piece was once taken out of his tail, his eyes were often banged, his ears often had bits taken out of them. He had a lame leg and this invariably would be much lamer after one of his expeditions."

M., 15. "My Dewey fights whenever he gets a chance to fight. I guess he has had a fight with every cat around our neighborhood."

M., 11. "It can fight like fury when it gets mad."

M., 15. "It could fight like a demon."

A large and important group of plays are those in which the

child and the cat play together. The main types of special games are shown in the following table. The percentages are based on the total number of both A and B classes.

	Boys.	Girls.
Plays with balls, marbles, spools, wads of paper, etc.,	17%	21
Runs after string, spools, paper, meat, apples, etc., tied to a string,	9	8
Hide and Seek,	6	12
Dressing it up in doll's clothes, etc.,		5

In addition to the cases given in the table are a large number of unclassified cases of which the following are examples.

(Boys): "I always put butter on her feet when I want to have fun;" "I put it under a newspaper and then tap on the paper and it tries to catch my fingers;" "I put paper shoes on him;" "I play leap frog with my cat;" "I play catcher with it." (Girls): "We play with a brass ring and the cat will put his paws through;" "I play house with it;" "When we play school it plays with me and sits in order;" "I tie paper to its tail and it tries to catch it;" "I take the cats paw and pretend to be playing he is playing on the piano, and then he purs;" "My cat liked to be nursed, and he was so lazy that nothing suited him better than to be laid in my doll's carriage and drawn around."

Anthropomorphisms and Moods. The following section tends to give the cat a very definite personality. It becomes quite human, not merely on its intellectual side, but it is also addicted to varying circumstantial moods.

Many children interpret the mewing, purring, movements of the eyes and tail, and other specialized motor activities as cat language, and unhesitatingly translate it into their own speech. The cat says: "I want some milk," "thank you," "come and play," "I love you," "please give me a drink of water," "please give me my dinner," "don't be cross to me," "open the door," "I am sorry, I won't do it again." Older children sometimes limit their statements by saying that they "imagine the cat says," etc., but the majority of the younger children have perfect faith that in its own way the cat does talk and expresses sentiments which the child regards as similar to his own.

M., 12. "I imagine he is calling his friends."

M., 12. "When you let it in it will thank you with a meow and then walk away gracefully."

F. "My pet cats always seemed to have remarkable powers. At least I thought so. They could do anything I wished them to do. If I wanted one of them to sing or talk and she would not do it, I would squeeze her just hard enough to make her mew or growl, and interpret the sound into the desired song or speech."

F. "I thought my cat could read. Because I would take his paw and point to a word and by this I thought he was reading."

F., 9. After I shook it I said, "Do you understand me?" and it nodded its head "Yes," or "No."

F. "When playing house and my kitten talked I used to think it sometimes said it was hungry, or sleepy, or ill. I also imagined it sometimes asked me to lay it in my cradle and not to hold it so much."

Champflury says 63 different myows have been counted, but notation of them is difficult. One, however, would appear to mean "Are you coming?"[1]

Dupont de Nemours, a naturalist of the eighteenth century, made himself ridiculous in the eyes of his compatriots by seeking to penetrate the mysteries of animal language. He devoted two years to the study of crow language, and even attempted to translate a nightingale's song. From his researches into the language of cats as compared with dogs, he says, "Its claws, and the power of climbing trees which its claws give it, furnish the cat with resources of experience and ideas denied the dog. The cat also has the advantage of a language which has the same vowels as pronounced by the dog, and with six consonants in addition, m, n, g, h, v, and f.[1]

Cats Sing. The cat's singing powers are brought out in not quite a quarter of the returns.

Boys. "It purrs;" "it hums;" "it would go purr, purr;" "sings when I pet it;" "my cat sings and purrs in a cats way;" "seems to make music for me when lying down;" "can make enough music when in a fight;" "can sing and make all kinds of music;" "at night he sings on the back fence;" "can't sing, but can make music by walking on the key board of the piano a half hour at a time."

Girls. "It sings three times a day;" "it purrs an awful lot every day;" "when it was purring you would think it was singing;" "sings, and it sounds very much like music;" "sings in its own language;" "sings from morning till night;" "sings in cat fashion;" "sings if pleased with anything;" "sings lovely tunes;" "it makes a loud noise;" "I always thought that when the kitten would purr softly it was singing and was also happy; my cats had to like music because I did, and any cat who would not play the piano was forced to do it. I would sit and take the cat in my lap and make her play. I enjoyed this, but not so with them;" "my greatest delight was to hear her purr, and I thought it was some kind of a trick and used to rub her nose to make her do it."

That cats are appreciative of kind treatment, are happy, sorry, cross, sympathetic, and show gratitude or bear grudges, is clearly brought out by the returns. They scold and sometimes swear, resent ill treatment and are thankful for good care. Among the descriptive expressions used in the returns are:

"It is glad when I do anything for it;" "looks as if it is trying to thank me;" "when I am cross to it it tries to pay me back;" "it is cross when I pull its tail;" "scolds when he has a mouse;" "I suppose that my cat swears in cat language;" "if I scold it it scolds back again;" "scolds at dogs;" "is sorry when it does wrong;" "sorry for me when I cried;" "happy when she has a mouse;" "scolds at dogs;" "sometimes scolds her kittens."

About half of those answering the syllabi think that the cat understands words.

"My cat can understand every word I say to him and will mind me."

[1] Horn, Mrs. C.: Spectator, Vol. LVIII, p. 97 (1885).

"When I talk to it it seems to understand me because it tries to answer and always obeys me." "I know it understands because when I say, 'there goes a mouse,' it will run around the house. It understands 'get down,' 'get up,' 'go away,' 'come in,' 'sit down,' etc." "When I tell her not to look at the bird she stops right away;" "I think she understands because when she has done wrong and I scold her, she looks at me with a sorrowful look and licks my hand."

Belief in the altruistic emotions of the cat seems to be less common than in the egoistic emotions, pity being mentioned in the two classes of returns only in the following per cents.

A. Boys 7%; girls 8%. B. Males, 15%; females 13%.

Characteristic expressions of this belief are "It pities other things that have not a good home;" "Seems to pity a person who is sick;" "When I cry it pities me very much;" "I think he pitied other cats when they were hurt;" "pities me when I get punished."

Thus the child projects upon his pet the feelings, moods, disposition, and intelligence which he himself possesses. The law of animism, which Tylor, Brinton, and others have identified in the savage is true in the child to a marked degree. The child's anthropomorphizing of his cat is twofold. Beside the projection of his own feeling and intelligence, his relation to his parents suggests to him a similar relation as existing between the pet and himself.

That the cat, anthropomorphized along much the same lines which we have followed in the child, has made and left an indelible impression in the consciousness of the race is well attested by its prevalence in myth and legend, as well as a large body of proverbs, witticisms, popular sayings, etc., many of which are still current. With the child these anthropomorphisms are passing impressions of a short period; in the race their influence is long dominant. With the child they are plastic and varying to the fancy; in the race, stiffened into myth, legend, and proverb, they are factors in the serious business of life. A few examples of the large extant body of cat proverbs and popular sayings are the following: "The cat invites the mouse to her feast." "Two cats and a mouse, two wives in one house, two dogs and one bone never agree." "When the weasel and the cat makes a marriage it is very ill presage." (When enemies council together, let honest folk beware.) "The more you rub a cat on the back the higher she sets up her tail." (Praise the vain and they are more than pleased.) "When the cat winketh, little wots the mouse what the cat thinketh." "He looks like the wild cat out of a bush." (Fiercely afraid.) "Fain would the cat fish eat, but she is loth to wet her feet." "Cats hide their claws." "Honest as the cat when the meat is out of reach." "To love as a cat loves mustard" (not at all). "Well might the cat wink when both her eyes were out." (Those bribed are worse than blind), etc.

Ethical Interpretations. One of the most clear cut and spontaneous phases brought out, is that of the cat's bad behavior on occasions. The child early comes to feel himself the master and law-giver of his world. The variety of children's punishments, which fall into well marked groups, indicates that boys' punishments are more often abrupt and severe ; the girls more frequently resort to moral suasion. The boys' range of punishment is less extensive than that of the girls'; the girl, *par excellence*, is the disciplinarian. In this phase, very prominent is the factor already noted, of the child's reasoning from the relation which he holds to his parents, and projecting similar conditions upon his pet.

Cats are bad occasionally in a little less than half of the reported cases.

A. Boys 33%; girls 37%. B. Males 43%; females 47%.

In most cases the standard by which the cat's acts are judged is a purely objective one, and intention is not taken into account, though a few children offer some apology and say the cat "did n't mean to do harm." In very few cases, however, are the natural instincts of the cat taken into account, and though catching rats and mice is often accounted a virtue, the catching of birds is designated as badness. It may be that in this moral objectivity, there is a reflection of the regime to which the child himself is subjected, for it is unfortunately too common to find children who regard an accident to their clothing or to property as on the same plane with a moral offence, because the same punishment is meted out to both. This objectivity of the moral standard is clearly brought out in the returns.

"Jumped at me;" "would fight a little rooster;" "bad habit of jumping into your lap;" "steals meat;" "plays with the stand covers;" "takes my small chickens;" "upset a bottle of varnish over him;" "jumps upon the chairs when we are eating;" "tore the lace curtains;" "bit me very badly;" "he has one fault and that is he likes to steal whenever he can;" "tore up my music;" "knocked the flowers down;" "pulls my dress while I am eating;" "when bad it would hang its head;" "stole fish;" "broke a beautiful plant that belonged to mother;" "I was angry when she would n't point to the figures when I asked her to."

About the same per cent. of the returns reporting occasional departures from the path of moral rectitude in the cat, also indicate very definite lines of punishment for feline misdemeanors.

A. Boys 21%; girls 30%. B. Males 33%; females 46%.

The kinds of punishment reported may be classified under four heads: corporal punishments (whipped, licked, switched, spanked, slapped, smacked, hit, kicked, shook); deprivation, either of food or liberty; moral suasion (threatened, scolded, reasoned with); exclusion (turned out of doors, chased, etc.). Beside these, several cases were reported in which the kind of

punishment was indefinite. These distinctions are brought out in the following table.

	Males.	Females.
Corporal punishment,	15%	45%
Deprivation,	3	8
Moral Suasion,	2	16
Exclusion,	1	6
Indefinite,	1	4

In about one-third of the returns, cats are reported as knowing right from wrong.

A. Boys 25%; girls 23%. B. Males 35%; females 41%.

Very noticeable is the fact that a larger proportion of the B class of returns representing reminiscence, than of the A class, representing children largely before adolescence, are positive for the cat's distinguishing right from wrong. Before adolescence the child apparently thinks little about the rightness and wrongness of acts as such. As we have seen, the child sense of ownership of inanimate objects is strong, passing into a sense of control of activity when the living animal takes the place of the inanimate object. Reasoning from his own sense of ownership or control, and his relation to his parents, the child derives a sense of authority based largely on superior strength. Right and wrong become mainly adherence to, and transgressions of, this central conception of authority. This character of the child's idea of right and wrong may be seen in a few typical cases.

F., 13. "When grandma whipped him it made me very cross, because I was the mistress of the cat and ought to punish him."

M. "He knew better because when he got upon the table I shouted and he gave me a sort of sheepish look and got down."

M. "It knew it was wrong for when I whipped him he would go under the stove and lie down."

F. "Because it would, if not doing right, hold its head down in such a guilty manner."

F. "Knows, because when it is watching my bird I just speak Dewey, and it turns its back on it."

F. "He would sneak up to the table for meat, and when mamma looked at him he would jump down."

F. "She knew, for she looked very much ashamed when she had done wrong."

F. "Would look around to see if any one was watching, then sneak, and if caught would run and hide."

F. "Knew, for when it was caught it would try to act very innocent."

The analogue of this phase of the reports is very apparent in the old conception of animals as moral beings, fully responsible for the moral or immoral quality of their acts. Conjuration of vermin was common, usually in the name of St. Gertrude, the first abbess of Nivelle in Belgium, and also the patron saint of travellers and cats, and protectress against the ravages of the small rodent.[1]

[1] Lawrence, R. M.: The Magic of the Horseshoe, p. 308.

Legal proceedings were common in France and Switzerland, and other parts of Europe against rats and mice, bulls, oxen, cows, mares, sheep, goats, pigs, dogs, moles, leeches, caterpillars, and various reptiles.[1] The Roman Catholic church claims full power to anathematize all animate and inanimate things, founding its authority on the Scriptures; as, cursing the serpent in the garden of Eden; [2] cursing the barren fig tree by Jesus; [3] and surely your blood of your lives will I require; at the hand of every beast will I require it;[4] if an ox gore a man or a woman, that they die, then the ox shall be surely stoned and his flesh shall not be eaten; but the owner of the ox shall be quit, etc.[5]

In the code of Lycurgus, and also in that of Draco, provision was made for the formal trial of animals for misdemeanors.[6] A vestige of this belief is found in that now obsolete term of English law, "deodand," meaning, according to Blackstone, "a personal chattel which was the immediate cause of the death of a rational creature," and for that reason given to God; that is, forfeited to the Crown to be applied to pious uses.

From the writings of a Benedictine monk, Leonard Vair, it appears that in certain districts of Spain, in the fifteenth century, when the inhabitants wished to drive away grasshoppers or noxious vermin, they chose a conjurer as judge and appointed counsel for the defendants, with a prosecuting attorney, who demanded justice in behalf of the aggrieved community. The mischief-makers were finally declared guilty,[7] and either duly anathematized, or formally excommunicated.

At this period, also, prosecutions of pigs, or sows guilty of devouring their young, were common. Barthelemew Chassenée, a famous French advocate of the sixteenth century, first won distinction by the originalty of his pleas in defense of some rats, in a notable trial at Autun. He represented to the judge that his clients found it extremely difficult to obey the summons issued to them by the court, owing to their being obliged to traverse a region abounding in cats, who were, moreover, especially alert, on account of the notoriety of the legal proceedings.[8]

This conception of the cat as a responsible moral agent was a factor, doubtless, in the part it has played in witchcraft. A

[1] Evans, E. P.: Atlantic Monthly, Vol. LIV, 1884.
[2] Genesis 3 : 14.
[3] Matthew 21 : 19.
[4] Genesis 9 : 5.
[5] Exodus 21 : 28.
[6] Lindsay, W. L.: Mind in the Lower Animals.
[7] Barriere: Mythology. Theirs, J. B.: Traites des Superstitions.
[8] Duval, L.: Rôle des Croyances populaires dans la protection des animaux, 1889.

second factor[1] entering in the complex witchcraft psychosis, is the peculiar gleaming quality of the cat's eyes, which Henderson suggests as the cause of connection with the weather and of its supernatural powers.[2]

Mutual Sympathy. This phase of the reports is interesting in that it reverses, at least as far as the child's view of the situation goes, the current verdict most often pronounced upon the cat, *i. e.*, that it is very deeply attached to places and haunts, but that its attachment to persons is very slight. Professor Shaler voices a widespread opinion among some naturalists when he says, "The most peculiar quality in the mind of cats is the intense way in which they cling to a well-known locality." "I have been unable to find any authentic instances which go to show the existence in cats of any real love for their masters." Quite different is the child's version of the matter.

About one-half of the returns make definite statements in regard to the natural affection between the child and the cat, and incidentally bring out the child's idea of love and tests of affection.

"He shows that he loves me because he is always ready to please me;" "when I come home it is glad;" "when I go away it cries;" "I love him and I can tell he loves me by the looks of his eyes;" "It likes to stay with me better than with any one else;" "When I was sick it came and sat on the bed and purred;" "It is sad when I go away;" "I feel lonely when I go away from it, and I suppose it does too, it is so glad to see me again;" "It misses me because when I come home it purrs and rubs around me."

Grief at separation, pleasure in being together, sympathy in illness or trouble, willingness to please, pleasure in personal contact, are all attributed to the cat by the child; the expression of the eye, lapping the hands or face ("kissing"), rubbing against the person or sitting in the lap, are all interpreted as marks of affection. The slyness, treachery, and selfishness which have been attributed to the cat tribe by adults, find little response in the heart of the child. Good qualities, real and imaginary, are emphasized; and faults, though recognized and punished, are judged by objective standards, and for the most part contain little imputation against the character of the cat. This is doubtless due, to some extent, to the fact that the reports are from children who have cats for pets and therefore represent cat-lovers, and do not include cat-haters, nor even those who are indifferent to cats. The psychology of the cat, as interpreted by the child, may be very diverse from the conclusions of the comparative psychologist, but in so far as it reflects the child's own mental attitudes as projected into the cat, it is of value to the student of child psychology. There is no doubt

[1] Sayce: *op. cit.*, p. 107. Footnote.
[2] Henderson, W.: Folklore of the Northern Counties, p. 206.

that animals of the cat tribe have had an important influence in the development of the race. In utility the cat is probably far outclassed by any of the other domestic animals, yet it is probable that no other animal has been so loved and hated, petted and persecuted, heaped with opprobrium and worshipped as a god. First idolized in Egypt, persecuted and an outcast in the middle ages, the companion of popes and saints, inspirer of poets and artists, the accursed and anathematized accomplice of witches, lending herself without protest to the behests of the evil one; these two extremes of attraction and repulsion may still be traced in the attitude of individuals toward the modern domestic cat. Among the admirers of the cat may be enumerated Leo XII, Pius IX, Petrarch, Victor Hugo, Shelley, Wordsworth, Matthew Arnold, Sir Isaac Newton, Dr. Johnson, Sir Walter Scott, and others too numerous to mention. Besides the modern artists who have made a specialty of painting cats, of whom Henriette Ronner and Lambert have been the most successful, the great artists of the sixteenth century introduced cats into their pictures, even into those of the holy family. Raphael, Tintoretto, Paul Veronese, and Correggio painted cats as accessories to their pictures.

Boswell, Napoleon, Lord Roberts and Raton, are among the many noted haters of cats.

Benvenuto Cellini, the Italian artist, painted a cat crouching at the feet of Judas.

Until as late as 1604, the tossing of cats into the fire on St. John's day was considered an encouragement to morality. In Picardy the burning of cats took place on the first Sunday of Lent. For many years, also, it was the custom of the inhabitants of Ypres to hurl cats from a tower on the second Wednesday in Lent.

These few cases cited, which might be indefinitely multiplied as examples of either phase of the cat psychosis, are sufficient to illustrate the diverse reactions which have their roots in the fear and attraction originally inspired by the animal. The huge size of the prehistoric members of the cat family, their strength, and stealthy terrible spring, were well calculated to make them the most dreaded enemies of primitive man, and to inspire him with superstitious awe; and, though the peaceful puss of our firesides is not a fear inspiring object, we still find a fear of cats which, in some cases, is so extreme as to be a pathological phenomenon. But mingled with the fear of the great cats, and the terror with which they must have inspired primitive man, must have been also an admiration of their lithe forms and graceful motions, the beauty and sleekness of their skins and the fire of their gleaming eyes, and it is these same qualities of which we find the children observant in their pets.

That the child is interested in the physical care and welfare of his pet is very clearly brought out by the returns. In no other subject has he gone into such minute detail as in his description of the cat's diet; how long and where it sleeps; its ailments and their treatment. In the cat's diet are enumerated meat, milk and cream, mice and rats, fish, ice cream, candy, cake, birds, soup, eggs, all kinds of vegetables, peanuts, oatmeal and other cereals, grasshoppers, coffee, custard pie, jelly roll, toast, bread, cheese, raw potatoes, sugar, grass, cooked tomatoes, seeds, and anything which the child himself eats. In this heterogeneous list little attention is given to the natural habits and food of the cat, the prevailing idea being that anything which the child likes will be equally appreciated by the cat. Place, time, and manner of feeding are all considered, and here, again, the habits of the owners are reflected. Most of the cats are fed three times a day, after the family meal, many have their special dishes and must be fed in a special place, but even among the older children no dietary especially adapted to the cat seems to receive consideration beyond the limits set by the cats refusing to eat certain things, and it appears from the list that cats may be trained to eat almost anything, and to a certain extent this is true of what they drink. One cat developed a special fondness for beer, and quite a number are reported as drinking coffee.

Children attach considerable importance to the places where their pets sleep, and also show a tendency to attribute to their pets their own habits. Many children report that their cats go to bed and sleep all night, a further instance in addition to the many reminders constantly coming to the surface in every topic upon which the returns have touched; that the child reasons outward from himself and tends to project his own conditions upon the objects of his environment. Cats are put to bed at a regular time, some have their special baskets or boxes, or sleep with their owners. Others are furnished with doll's bed or cradles, and their little mistresses evince great disappointment when such arrangements fail to be appreciated.

The ills and accidents which befall the cat appeal strongly to the sympathy of the child. This is more marked in girls than in boys, the appeal to curiosity sometimes outweighing that to the sympathy, in the case of the latter. The various ailments are described with minute detail and the remedies are as varied as the ills. Here, again, the treatment, whether or not adapted to the cat, is evidently a reflection of the child's own experience. In addition to external and internal remedies, warmth, bathing, a soft bed, special diet and petting are most frequently mentioned as curative agencies. The returns evidence a great solicitude for the cat's welfare, and the willingness of the child to take much pains to secure it.

"I put it in a big box;" "laid her in her little bed;" "I tried to show it that I was helping it;" "put it in the sun in summer and by the stove in winter;" "gave it cough medicine, wrapped it in a blanket and the next day it was all right;" "I tied up and bathed her foot;" "wrapped her cut paw in a soft cloth and held her on my lap;" "I took a warm piece of goods and laid him on it behind the stove;" "covered it up warm;" "laid it on a cushion and gave it catnip;" "gave her medicine to settle her stomach;" "warmed some flannel and wrapped her in it;" "gave her Peruna;" "gave it sugar tied in a rag and a bottle of milk;" "made it a warm bed to lay on;" "did all I could to help him;" "put water on it to cure the fits;" "I got all kinds of cat medicine, but they did no good. It was worse in summer and better in winter;" "greased his ear;" "I did my best to get my dear cat well; sent him to the hospital;" "sent him to the cat home;" "put a cloth on his sore foot;" "tried to comfort him the best I could; gave it a teaspoonful of sugar."

Children are close observers of the symptoms of illness in their pets, and very quickly notice unusual conditions, such as harshness and dryness of the coat, a hot nose, lack of playfulness and loss of appetite, and though the remedies are not always adapted to the disease, it is seldom that some effort for alleviation is not made. The child's interest in the physical condition of his pet has many analogies, not only in the past, but much more in the present day movements for bettering the cats conditions, which are numerous and increasing.

The Sultan, El Daher Beybars, who reigned in Egypt and Syria about 1200 A. D., at his death left a garden 'Gheyt-el-Quoltah' (the cat's orchard), situated near his mosque outside Cairo, for the support of homeless cats. Subsequently the field was sold and resold several times by the administrator and purchasers. In consequence of a series of dilapidations it now produces a nominal rent of fifteen piastres a year, which, with certain other legacies is appropriated to the maintenance of cats. The Kadi, who is the official administrator of all pious and charitable bequests, orders that at the hour of afternoon prayer, between noon and sunset, a daily distribution of animals' entrails and refuse meat from the butchers' stalls, chopped up together, shall be made to the cats of the neighborhood.

In modern times the growth of societies for the prevention of cruelty to animals, has done much toward caring for and alleviating the condition of the stray cat. At Battersea, Eng., there is a cat refuge conducted similarly to that of the societies for the prevention of cruelty to animals in the United States, where stray animals may be sent and kept for a few days awaiting the possible appearance of a claimant, at the end of which time, if unclaimed, the animals are painlessly put to death. There are now many refuges for maimed, sick, or strayed animals established in various cities which, through their publications and example, have greatly fostered a humane spirit toward animals in both children and adults, and which have contributed

to bring about a more intelligent care of animals. The Morris Refuge, in Philadelphia, established in 1874, is one of the largest of these institutions, and has served as a model for others. A wagon is kept at the Refuge to respond to calls and visits any residence where suffering animals may require their attention. The agent of the society, with his family, lives at the Refuge and receives animals at any time. This home provides not only for cats, but its object is to care for or dispose of suffering animals of all sorts. In 1895, of the 23,067 animals which came under the care of the association, 19,672 were cats. Good homes are found for both cats and dogs, but not until the agent is sure that they will be kindly treated.

Not only in the United States but in many European cities this humanitarian interest has greatly increased in recent years. In Paris two English ladies have founded a hospital near Asniéres, where sick pet animals may be tended in illness or boarded for ten cents a day. There is also a shanty ward connected, where patients of the pauper class are received and tended carefully, and afterwards sold or given away to reliable persons. In Florence, a cloister, near St. Lorenzo's church, is a refuge for cats. Here are to be found specimens of all colors, sizes, and kinds, and any one who wants a cat may have it for the asking. The owner of the cat who is unable or unwilling to keep it may take it there, where it will be fed and well treated.

In Rome, at a certain hour daily, the butchers drive through the city distributing cat's meat. They give a peculiar call, which the cats soon learn to recognize, and come running out of the houses for their allowances. The cost is defrayed by the owners, who pay a certain rate per month.

Death and Funerals. This phase of the reports, while exhibiting a wide variation, is far more specialized and at the same time more spontaneous than any other phase brought out in the returns. Nearly one-half of the cats described in the returns live only in the memories of their owners, where they are still fondly cherished. Numerous funeral ceremonies are described, and by far the larger number of the dead pets are buried with more or less ceremony, though a few expressed a desire to have them stuffed so that they could keep them. While it is evident that both imitation and play, with a large dramatic element, are to be found in the descriptions of cat funerals, there is also much genuine grief and tenderness, and a desire that the dead pet shall be gently cared for and respect shown to her memory. Flowers are placed on the grave, not only at the time of the funeral but for successive seasons. In this connection the children's ideas and feelings are best expressed in their own words.

F., 13. "It had a casket and a nice grave under the wild apple tree, and is going to have a marble monument."

F. "We put it in a pasteboard box and buried it under the sweet cherry tree, and every summer I put flowers on its grave."

M., 14. "My brother and his friends and I had a grand funeral. We put it in a box and made a grave and then planted violets over it."

F. "When it died we had a big funeral, my friend and I being real mourners. We used part of the funeral service and kept the ground covered with flowers."

M. "Great was my dismay one morning to find my pet with a broken leg caused by being stepped upon by a horse. I nursed it the best I could and prayed each night for its recovery, but all in vain, for it died in a few days. I gave it all the benefits of a Christian burial and kept its grave fresh with flowers. I planted a rose bush on its grave and it is now a large bush which has spread all over the place but still marks the spot where the poor cat lies."

F. "When my father told me that my cat was dead I cried as if my heart would break; but he consolled me by making a coffin for her. When the coffin was finished I put Tabatha in it and nailed a cover on it. Then, my little brother as undertaker carried the coffin, my sister carried the shovel, and I came next with a large boquet, as the chief mourner. Behind me came all my playmates each carrying a boquet. We went up to our back yard and in a grave which had been dug we placed the cat. After we had buried the cat and a mound had been made of sand, we placed the boquets on the grave and then my brother gave the funeral oration. When he finished we sang a hymn to the cat and then departed with sorrowful hearts."

F. "I shed a great many tears the morning I awoke to find my pet dead. With my playmates help I put him in a box and nailed it together tightly. I carried it to the foot of the garden and buried it with funeral services. A few days later I went with my friends and erected a monument, which was a large stone with label with the cat's name written upon it. Then for a great many days I went with my dolls to the grave to carry flowers. Quite often the flowers were wet with childish tears shed in mourning for my pet."

The easiest explanation of cat funerals may be that it follows naturally from the child's anthropomorphizing its pet; *i. e.*, that the child has a funeral for his cat just as he builds a house for it, carries on a conversation with it, puts it in the doll's bed, dresses it in doll's clothes, takes it for a walk, etc. It is very suggestive to find this phase represented phylogenetically. The worship of the cat in Egypt seems to have many points in common with the child's relation to his pet. Professor Maspero is of the opinion that the worship of the cat among the lower middle classes of Egypt was largely pure and simple adoration of the cat itself; not the worship of the official god incarnated in it.[1] In support of this belief are certain stelæ in the Museum of Turin. On one belonging to the age of the Eighteenth Dynasty, huge figures of a swallow and a cat are painted with a table of offerings standing before them, as well as two kneeling scribes. Accompanying inscriptions say that these are offer-

[1] Etudes de Mythologie et d'Archéologie Egyptiennes, Vol. II, p. 395, *et seq.* (cited by Sayce, p. 107).

ings to the "good cat" and "good swallow;" not to any of the state gods who had hidden themselves under these animal forms. Other stelae exhibit the same phase. The worship of the swallow, cat, and goose, which had commenced as the pure and simple adoration of these creatures in themselves, always remained so for the multitude. "We must not forget that the Orientals regard beasts somewhat differently from ourselves. They ascribe to them a language, a knowledge of the future, an extreme acuteness of the senses which allows them to perceive objects and beings invisible to man."

St. Clement, of Alexandria, thus describes the religion of the Egyptians.[1] "Among the Egyptians the temples are surrounded with groves and consecrated pastures; they are provided with propylaea, and their courts are encircled with an infinite number of columns; their walls glitter with foreign marbles and paintings of the highest art; the sanctuary is resplendent with gold and silver and electrum, and many colored stones from India and Ethiopia; the shrine within is veiled by a curtain wrought with gold. . . . A pastophorus . . . singing a pæan in the Egyptian language, with a pompous air draws aside a small portion of the curtain as if about to show us the god. No god is found therein but a cat . . . . or some such brute animal . . . . that rolls itself on a purple coverlet."

Herodotus says when a house took fire the Egyptians of his time thought only of saving the cats and, continues Sayce, "To this day the cat is honored above all other animals on the banks of the Nile." [2]

There are many cemeteries of mummified animals. At Bubastus, Beni-Hassan, and other places, vast cemeteries of cats have been found. The embalming of cats was accompanied with solemn ceremonies, and entailed on each member of the house where the pet or worshipped cat had died, the shaving of the eyebrows.

In summarizing the results of the present study the following points may be noted:

I. The cat's popularity as a pet; 28.4% of the 2,835 animal pets which were reported being cats. Although this cannot be said to represent the spontaneous choice of the child as regards pets since, as shown by the table on page 9, the cat in many cases came into the child's possession either by accident or as a gift, in which the child's preference may or may not have been concerned, it does show that, once possessed, the cat has proved an acceptable pet.

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[1] Paedag., III, 2 (quoted by Sayce, p. 100).

[2] Sayce; p. 112. Also DeForest, J. W.: Atlantic Mon., Vol. XXXIII, p. 556.

II. The study as a whole brings out two queries with some suggestions as to their answers. What are the peculiar traits inherent in the cat which appeal to the child, and why? In tracing the history of the cat in its relation to the human race, we find the two opposite extremes of fear and admiration, attraction and repulsion, based upon the physical characteristics and habits of the cat, and foremost among the children's reasons for preference are their enjoyment of the play of the cat, delight in its varied and graceful movements, and the great number of its spontaneous activities. The fear psychosis was not brought out in the returns, as only those children who were fond of cats wrote about them; but abundant examples of this, ranging from mere dislike to pathological cases, can be found in any community, and literature and history fully illustrate the fact that both of the primitive reactions have persisted. According to the returns the cat is nearly twice as often a girl's pet as a boy's, 18.8% of the 1,180 boys in the total number of returns, and 35.1% of the 1,655 girls choosing the cat as the animal upon which they wrote.

III. The child's attitude toward the cat is largely anthropomorphic. He attributes to the cat the same thoughts and feelings which he himself experiences, and in his treatment of his pet unconsciously reveals his own standards of right and wrong, his tests of affection, his preferences and dislikes. In this connection one of the most interesting points brought out is the child's inclination to make the test of right and wrong an objective conformity to the will of the owner.

IV. The care of a pet tends to develop a sense of responsibility in the child and a humane consideration for other animals. Comparatively few instances of neglect or forgetfulness are reported, and these are usually mentioned with regret. In some cases the fighting and hunting instincts conflict with the humanitarian instincts.

V. In this phase of the child's playing we have an important sidelight upon the psychology of childhood. Groos has seen in the child's anthropomorphic plays an anticipation of its future life work; the disciple of recapitulation sees in such plays the backward look; but, whatever the explanation, the largest and most spontaneous group of child's plays in general are anthropomorphic.

It is this character of the child's playing which gives to childhood its distinctive mark as differing from the later stage of adolescence. The one passion of childhood is for anthropomorphic plays, toy animals, horses, and men; houses, boats, machinery; playing Indian, soldier, school, store, house, doll babies; playing at sickness, death, matrimony, and whatnot. In fact, there is not a single human relation, occupation, or

character which the child does not embody in his play, and impersonate with all the zest of complete illusion. The child's plays, of course, strike their roots deep into the past of the race. He likes to exercise, especially the biceps muscles in striking with a club, batting, etc. ; also in games of throwing balls, rocks, marbles. Going still farther back he is the wild animal, the horse, the bear, the dog, etc., in his play. If now childhood may be regarded as both recapitulatory and anticipatory, finding its best expression in spontaneous plays, an important function of education is to furnish, as far as possible, material for such plays and keep its " hands off."

HOW WORDS GET MEANING.

By Will Grant Chambers, State Normal School, Moorhead, Minn.

Have you ever stood in a country meadow, in the early morning, surrounded by a dense fog? If so you will remember how only the objects within reach of your arm were clearly visible. Beyond these, in a narrow zone, were things which could be but dimly seen; the outlines of stump and bush and rock were indistinct and their details obliterated, but still recognizable in a vague sort of way. Beyond this area was a third zone in which everything seemed strangely exaggerated and distorted; trees and cattle were transformed into mysterious, impending monsters and the most familiar features of the landscape moulded into unknown forms; posts became stalking giants; beyond this region and above it all the fog closed in like a thick white wall, shutting out the great unknown. Between the different regions no clearly defined boundaries were discoverable; each faded into its neighbor by imperceptible degrees.

Then you will recall how, as the sun came up, the fog was thinned and each separate area was pushed backward. Objects which before were beyond the thick white wall now slowly pushed forward through its substance, but still in unrecognizable form and exaggerated size; things which had been distorted and strange now began to show familiar features and approach their natural size, but could be recognized in only a general way; and what before was but vaguely perceived now stood out clear and distinct in every detail. Higher rose the sun and farther receded the regions of dimness and illusion until the circumference of the area of clear vision, which at first could be reached with extended hand, had blended with the horizon. Then the only condition of clear perception of any object, whether near or distant, was the focusing of the eye upon it.

Has it ever occurred to you how exactly this experience symbolizes the mental development of a child? In the early years of life he has an accurate knowledge (if, indeed, he can be said to have *accurate* knowledge of anything) of only those things which are most immediate and familiar, and an adequate reaction for only those situations which are fairly constant or frequently recurrent; outside the realm of familiarity is a region whose objects are slightly known and whose situations

are met by the child in a bungling sort of adjustment ; beyond this field, again, is a zone of mystery, of illusion, of mistakes and failures in adaptation. And finally, beyond it all is the region of the great unknown, the region whose objects, personages, and situations have never yet directly affected the child's life in the slightest degree. The child unquestionably perceives the world through a mental fog. But as the sun of experience rises higher and higher these boundaries are beaten back. Things are constantly projected from the great unknown into the region of mystery, illusion, and error. The formerly mysterious and mistaken becomes the vaguely-perceived, the slightly-known, the clumsily-used. While what was partially understood is transformed into the familiar and perfectly-adjusted-to affair of common experience. Farther and farther do the boundaries recede, narrower and narrower do the outlying zones become, until in the mature scholar the circumference of the circle of things clearly understood and situations adequately-reacted-to has become coincident with the boundary of human knowledge in his field. Then the only condition of his perfect understanding of any new object or situation projected within his horizon is the focusing of his *apperceptions-masse* upon it.

While this parallel may be traced out in the development of any phase of human life it is perhaps most clearly seen in following the development of children's use of language. We need not go to the numerous studies of vocabularies of the first two or three years of life to discover this parallel; for, though it is evident there, numerous other considerations tend to obscure it somewhat. The most fruitful field is found in a study of the expansion of the vocabulary during the years of school life. It is in this field that the present study is conducted.

It seems to have been an almost universal tendency of the past, among common people at least, to over-estimate the intelligence of children. It seems to have been assumed for example, when a child began to use a certain word, that in some mysterious fashion the full meaning of the word was appreciated, that the symbol carried its own content with it. Hence when a child used certain words the adult hearer read into those words the full meaning gained from his long experience and gave the child credit for much greater intelligence than, in reality, he possessed. And conditions are not very different to-day.

Now, no one would say that because a child can swing a hatchet he can therefore hew to a line as well as a man who uses the same hatchet. The accurate use of that tool comes only through long practice, after much haggling and mutila-

tion. Everybody realizes that. But it is less apparent, though it should not be, that the accurate use of a word demands a long period of practice, begun with much haggling and mutilation. The inexperienced user of a new word chops now on one side, now on the other side of the line, if, indeed, he realizes that there is any line there.

With this truth in mind, and for the purpose of discovering, if possible, just how the correct use of words is attained, the teachers in the public schools of certain Minnesota cities and towns in the Red River Valley were asked to co-operate in gathering data bearing upon the problem. Superintendents and teachers responded heartily and copies of the following syllabus were distributed among them for their guidance.

Syllabus. How Words Get Meaning.

Few parents or teachers have any understanding of how much or how little the words used by their children mean to them, or how their meaning is cleared up by experience and education. With a view to throwing light on this question, teachers are asked to co-operate with the writer of this circular in finding out just what content certain words commonly found in school literature have for their pupils. Studies using the same words have already been made by Professor Earl Barnes on school children in England and in our eastern states,[1] and a comparison of our results with his will be both interesting and valuable. Those who are willing to co-operate in this study are requested to read and carefully obey the following suggestions.

Suggestions to Teachers.

1. Give the following exercise to your pupils as a regular composition lesson.
2. Do not say anything about what is to be done with the papers. Let them be regarded as a part of the regular school work.
3. Do not have the papers copied or corrected. Do not say anything about the pupils being careful of their writing or spelling. We care only for the spontaneous ideas. Expression is not regarded.
4. Do not make any explanations or comments, or give any illustration of what is required, other than the simple statements below.
5. Do not allow the children to ask any questions, lest they suggest answers to others. If they wish to make inquiries have them consult you privately.
6. Do not give any hints beforehand that such an exercise is to be given. The pupils should not talk it over.
7. For this reason, as far as possible, all teachers in the same building should give the exercise during the same school session.
8. Every child who can write at all should be included in the exercise, from the first grade upward.
9. Be sure that the name and age of each pupil is at the top of his paper. Papers are worthless without age and sex.
10. Write the questions on the board one at a time, and be sure that the children have sufficient time to finish each answer before the following question is given.

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[1] How words get content, Barnes's Studies in Education, Vol. II, pp. 43-61.

11. After the papers have been collected, the teacher should write at the top of each the nationality of the parents of the child writing it, so far as it is known. In the absence of more definite information the word "foreign" or "American" will suffice.

12. Every paper should be sent in, even if it has n't a word on it but the pupil's age and name.

13. The following questions should be written on the blackboard in order and numbered by the pupils accordingly in their answers:

1. What do you mean by the word "*monk?*"
2. What do you mean by the word "*peasant?*"
3. What do you mean by the word "*emperor?*"
4. What do you mean by the word "*armor?*"
5. What do you mean by the word "*nation?*"
6. What do you mean by the word "*school?*"

Papers should be forwarded as soon as convenient, but not later than March 30, 1903, to

WILL GRANT CHAMBERS,
State Normal School,
Moorhead, Minnesota.

The directions were carefully carried out and papers from 2,922 children were sent in. Of these children 1,557 were girls and 1,365 were boys; of the girls 494 had parents of American birth, 1,063 of foreign birth; of the boys 419 were born of American parents, 946 of foreign. A large majority of the children of foreign parentage came from Scandinavian stock. The ages run from 5 to 27, but the number of papers of the extreme ages were so few that it seemed wise to combine 5 with 6, and all above 18 with the papers of that age. The papers were examined and the results tabulated by members of the child study seminar in the Moorhead State Normal School under direction of the writer. On the data furnished by this study the following discussion is based.

A word of explanation may be in place as to why these particular words were chosen. There are several reasons:

1. They are the words used by Professor Earl Barnes in his studies in England and our eastern states, and it seemed desirable to make this study a comparative one.

2. "School" was used in order to discover to what extent children of each age could express their meaning of a word with which they are perfectly familiar.

3. "Monk," "peasant," "emperor," "armor," and "nation" are words of whose meaning most children are ignorant on entering school, but whose meaning we have a right to expect to be known to children arrived at high school age. We should be able, therefore, to trace the complete development of these concepts in the successive school years.

Let us begin by examining a few typical papers written by children of different ages: They are selected at random.

Paper 1. Foreign, boy, age 6.

1.
2.
3.
4.
5.
6. School is a place to write and read and sing.

Paper 2. American, girl, age 6.

1. Monkey.
2. Be pleasant.
3.
4. Salvation Army.
5. Initial.
6. To learn.

Paper 3. Foreign, boy, age 8.

1. The word monk means monkey.
2. The word peasant means pleasant.
3. The word emperor means empty.
4. The word armor means army.
5. The word nation means nature.
6. The word school means to learn.

Paper 4. Foreign, girl, age 8.

1. The word monk means
2.
3. The word emperor means empty jar.
4. The word armor means farmer.
5. The word nation means mission.
6. The word school means school house.

Paper 5. American, girl, age 8.

1. A monk is a person who live by themselves up on high mountains and have large dogs that go out and find travellers in the snow.
2. A peasant is a person who is poor.
3. An emperor is a kind of King.
4. An armor is a thing you wear in war to shield you.
5. A nation is a whole lot of states together.
6. School is where you go to learn Arithmetic, Spelling, Geography, Language.

Paper 6. American, boy, age 9.

1. A monk is a little animal that look like a squiril.
2. Peasant is a poor farmer.
3. An emperor is a rich man.
4. An armor is a sword and everything a soldor neads to gard themself.
5. Nation is when a country is free from another country.

6. A school is a house wher children go and to read and write.

Paper 7. Foreign, boy, age 10.

1. Do not monk so much.
2. It is a peasant to get something that you like.
3. -
4. Armor is a Name.
5. Nation means to took care.
6. School mean to learn and be good.

Paper 8. Foreign, girl, age 10.

1. The word monk means a animal that lives in trees.
2. The word peasant means
3. The word emperor means a ruler.
4. The word armor means a suit and things that you use in war.
5. The word nation means a state.
6. The word school means a place to sent children to lear Arithmetic and other steaties.

Paper 9. Foreign, boy, age 12.

1. I mean by the word "monk" a rich preast.
2. I mean by the word "peasant"
3. I mean by the word "emperor" a man that ows a country next to his own.
4. I mean by the word "Armor" a man oho ouns a packing house.
5. I mean by the word "nation" a class of people.
6. I mean by the word "school" a Building where children go to learn things.

Paper 10. Foreign, boy, age 12.

1. Monk is a religious sect or person who lives in a monastery and appears to be religious.
2. A peasant is one of the lowest class of people or poorest in wealth who till the soil in Europe.
3. An emperor is a person who rules or oversees a body of people and attends to their business.
4. An Armor is a coat of mail worn by the people of olden times who used it to protect them. It covered them all over.
5. A nation is a body of people living in one separate country under one government.
6. School is a place or house where children, men or women are educated or taught.

Paper 11. Foreign, boy, age 14.

1. The word "monk" means to me that it is the name of man who has made a vow for a certain time to live a devoted and quiet life in a monastery.
2. The word "peasant" means to me that it is the name of

a poor class of people in the southern part of Europe. They are very good fighters when in war but they do not try a fight on an open field but try to steal marches on their enimy and take them by surprise in the night.

3. The word "emperor" means to me that it is the name of a ruler of two nations — Germany and Austria Hungary.

4. The word "armor" means to me that it is the name of all the weapons that a soldier or sailor needs to defend himself with.

5. The word "nation" means to me that it is the name of a country recognized by the rest of the world as a strong nation.

6. The word "school" means to me that is a place or building — private or public — It is a place for learning something.

Paper 12. American, girl, age 14.

1. A monk is a man who lives secluded from the rest of the world and devotes his life to Christian work.

2. Peasant is an English word which means farmer or those residing in the country.

3. An emperor is a ruler. He generally rules a limited monarchy.

4. Armor is a steel coat or suit worn by men in olden times to protect them when in battle from the weapons of the enemy.

5. A nation is a body of people grouped together under one head, and obeying rules laid down by this head or by itself.

6. A school is a number of pupils gathered together for the purpose of receiving instruction which is given by a teacher.

Paper 13. Foreign, girl, age 16.

1. Monk is the name of some animal.

2. The word peasant means quiet and lonely, what they call the French settlers in Canada.

3. The word emperor means highly in honor or high class of people.

4. The word armor means full of arm or one whow is always in arm.

5. The word nation means one of great number or a large number of people in one place.

6. The word school means a number of scholars, or a place where one is touch things that will be use to them when out in the wide world.

Paper 14. American, boy, age 18.

1. A *monk* is a type of the human race that lived in the Dark Ages. These monks were very learned, and from them much of our learning to-day has been handed down.

2. A *peasant* is an example of the poorest class of people in

many countries of Europe. These peasants live very humbly and most of their clothes they weave themselves.

3. An *emperor* is a man, who by birth, reigns over an absolute monarchy.

4. Armor has several meanings. One is the old suit of armor worn by the old Norman soldiers when they conquered Britain. Another is a battleship of the present era being covered with thick plates of iron and steel to protect it from injury from projectiles fired at it by other vessels.

5. A nation comprises many states or provinces brought together under one government.

6. A school is an institution for the purpose of educating children and grown people as well.

Without examining other papers we can see in these few the gradual expansion and enrichment of the content of these words. A correct definition in the early years is a mere outline, a framework of bare essentials. In later years these outlines are filled in with various details, according to the experience of the writer. We therefore find greater individuality in the definitions of the older children. We have here, also, examples of vague concepts, of incorrect concepts, and of absolute absence of content.

It is evident that the definitions of all these papers may be classified under four headings: (1) There may be no answer at all, which stands for absence of content. (2) There may be a wholly wrong answer. (3) There may be an answer with one or more correct features, which we may classify as vaguely right. (4) There may be an answer wholly correct. By correct we do not mean a dictionary definition, but a definition which contains, explicitly or implicitly, all the essential elements of the concept. It is the possibility of this exact classification which makes this study such an excellent one both as to method — for it brings out clearly certain details of technique in child study — and as to clear cut results.

It is both impossible and unnecessary here to go into a minute study of the growth of meaning of each of these six words; impossible for lack of space, and unnecessary because each word shows precisely the same order of development and varies from the others only in the rapidity of its growth in meaning. As typical of all words let us examine the definitions of "school," a word familiar to all the children contributing to this study, and "monk," a word quite unknown to most of the younger ones.

Classifying all the statements referring to these words under the headings given above, we get the following tables. For reasons perfectly apparent, none of the children have a wholly

wrong concept for "school," therefore that rubric does not appear in the first table

TABLE I. *School.*

Age.	6	7	8	9	10	11	12	13	14	15	16	17	18
No answer,	18%	26%	28%	22%	13%	6%	5%	2%	1%	1%	2%	3%	1%
Vaguely right,	43	45	37	20	13	24	3	6	4	8	4	5	2
Correct,	39	29	35	58	74	70	92	92	95	91	94	92	97

In this table definitions were considered correct which contained the following three elements: (1) a place or house, (2) where there are children, and (3) a teacher or instruction. Answers of this type are found in papers 5, 6, 8, 9, 10, 12, 13, and 14, quoted above. Vaguely right meanings are illustrated in papers 1, 2, 3, 4, 7, and 11. None of the papers quoted happens to contain an example of the first rubric.

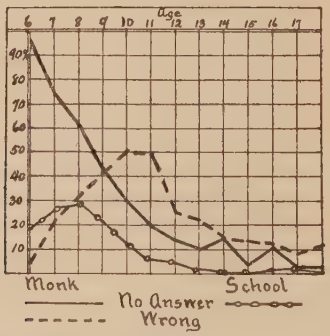
TABLE II. *Monk.*

Age.	6	7	8	9	10	11	12	13	14	15	16	17	18
No answer,	96%	74%	61%	44%	30%	20%	14%	11%	15%	4%	11%	3%	3%
Wrong answer,	4	23	33	41	51	49	26	23	15	14	13	8	12
Vaguely right,	0	1	3	10	12	15	42	26	24	14	7	13	27
Correct,	0	2	3	5	7	16	18	40	46	68	69	76	58

In this table definitions were classified as correct if they included the elements (1) a man, (2) engaged in religious work or leading a pious life, and (3) living in seclusion. Such answers are found in papers 10, 11, 12, and 14. If only one or two of those elements appear in the statement it is considered vaguely right. For examples of this type refer to papers 5 and 9. Wrong answers appear in papers 2, 3, 6, 7, 8, and 13, while no answers are given in papers 1 and 4.

For the purpose of comparison the percentages of "no answer" for both school and monk and "wrong answer" for monk are platted in Fig. 1, there being no wrong answers for school.

FIG. I.



The curves for "no answer" represent the number of chil-

dren who have never heard, or seen the word used, or have no meaning for it that they can express. In the case of both "monk" and "school" this curve drops rapidly with succeeding years. As we would expect, five times as many children at the age of six are without a content for the word "monk" as for the word "school," and at every age the former number is two to five times as great as the latter. In the case of school it will be noted that more children of seven, eight, and nine fail to give an answer than at six. Since all the children must have had some content for this word, we must explain the rise in the curve by a growing consciousness of inability to adequately express a familiar meaning. Indeed, this entire curve might well be taken to represent the tendency of children to lack confidence in their ability to express a perfectly simple and easy idea in writing.

The curve of "wrong answer" for monk represents the number of children of each age who have seen or heard the symbol but have associated with it wrong ideas. It is significant that this curve rises almost as rapidly from six to ten as the curve for "no answer" falls. This "wrong answer" tendency is intermediate in the evolution of the concept between no content and a correct content. Many children who, at six or seven, have not heard the word "monk" used, at eight or nine recognize the symbol but associate wrong images with it, or confuse it with other words that have a similar sound. Thus "Monk is a monkey," or "Monk is a chip monk," show such a confusion through euphonious analogy. The ages eight to eleven are especially characterized by this sort of answer. This seems to be a "hit or miss" period, a time when the child would rather guess than confess igorance. The definitions of the other words used in this study sustain this conclusion, showing the greatest number of wrong answers from nine to eleven. This is what we might expect from the known characteristics of the pre-adolescent period. Many writers speak of it as a period of transition. It is a time of readjustments, of the establishment of new co-ordinations, physical and mental. Kline [1] locates the beginning of the third running away period about here, and explains it as due to inability to put forth contained effort, endure strain or unpleasant experiences. It is also a time of carelessness. Bryan [2] describes this age as one susceptible to great fatigue, and as a transition period second in importance only to puberty. Others speak of it as a time of uncertain adjustments, instability, and lack of

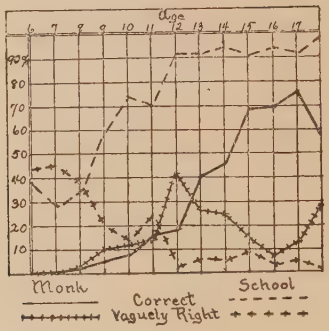
[1] In "Truancy as Related to the Migrating Instinct," *Ped. Sem.*, Vol. V.

[2] In his "Nascent Stages and their Pedagogical Significance," *Ped. Sem.*, Vol. VII.

concentration. These statements explain, to some extent at least, the substitution of wrong answers for no answers during this period.[1]

Let us now turn from these negative aspects of the study to the positive aspects as shown in the curves of "correct" and "vaguely right" statements for both monk and school, platted in Fig. II from tables I and II.

FIG. II.



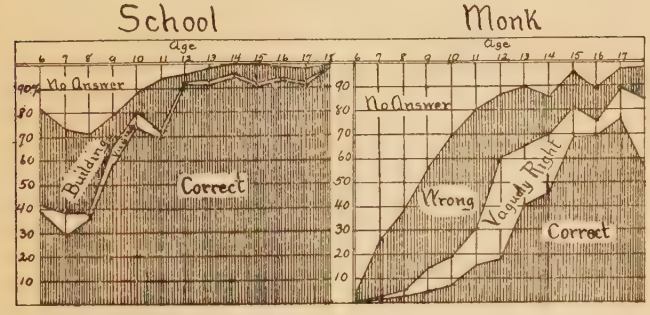
This chart reverses the conditions of Fig. I. At every age from 30% to 70% more correct answers are given for "school" than for "monk," and the former curve has a much more abrupt rise between the ages of seven and twelve than has the latter. But in general the two lines are parallel. The conditions with reference to the curves for "vaguely right" statements are somewhat different. For "school," this is a diminishing tendency from the first; for "monk" it is an increasing tendency to the age of twelve, after which it shows a rapid decline. This difference is easily understood. "School" is a fairly familiar concept from the first, and its vague forms are rapidly cleared up and give way to correct statements. "Monk," on the other hand, is unknown at first, and is always quite remote from the average child's experience. It therefore has a vague significance to more children and for a longer time. After the age of twelve this line falls rapidly, and we note a correspondingly rapid rise in the curve of correct definitions, indicating the passing of ideas from the realm of the indefinite to that of the clear.

Several other interesting facts are shown on this chart. The first is that every drop or break in rising curves of correct statements is compensated for by a rise in the corresponding

[1] Barnes's study does not show this increase in the number of wrong answers, except in the case of the word "emperor," where a slight increase appears at the age of ten. See p. 57.

curve of vaguely right statements, thus keeping the expansion of the content fairly constant. The second significant fact is the rapid rise in the "vaguely right" curve for monk in the twelfth year, and its high position during the next two years. This immediately follows the rise and is coincident with the decline of the "wrong" curve of Fig. I, thus showing the transition of wrong ideas into those vaguely right, — these developing into correct concepts in the next stage of development. Taking Figs. I and II together, then, we see the crest of the wave of development sweep across the chart in this order, — no content, wrong content, vague content, correct content. This does not mean that an individual always has a wrong content for a new word before he gets a correct content; but it means that when one has a wrong meaning for a word, this stage is intermediate between no meaning and a vaguely right meaning. It may easily happen that many new concepts are mastered without passing through a stage of misuse.

FIG. III.



In Figure III, following Professor Barnes's plan,[1] most of the above facts are brought out in a different way and some new ones are suggested. In this figure for monk the curve for "correct answer" is platted from the base line. In locating the curve for "vaguely right" answers we do not start from the base line but from the curve for "correct" answers, adding the percentage for each age to the percentage of correct answers for that age; and similarly for other curves. We have, then, the proportion of each kind of answer for a given year represented by an area, and not by the distance of the line from the base line. Thus the area between the lowest curve and the base line represents the proportion of correct concepts; the area between the top line and the highest curve represents the proportion of children having no content for the word, and similarly for the other rubrics. The respective areas are labeled in

[1] Studies in Education, Vol. II. pp. 49, 54, and 57.

the diagrams and alternate ones are shaded for clearness. In the diagram for "school" the area of vaguely right answers is divided to show the proportion of children who think of school simply as a house or building. It will be noted that in the early years the material side appeals very strongly to the child mind and that about 40 per cent. of them regard a school simply as a building. This idea is responsible for the greater part of the vaguely right answers throughout the entire school life. This tendency shrinks rapidly to the twelfth year, when it undergoes a considerable expansion during the early adolescent stage of development. The other kinds of vague answers have almost disappeared after the age of twelve; such, for example, as "To learn," "The school is for teaching," etc.

Taking the diagram for "monk," in Fig. III, as typical for a word that is strange to children on entering school, but found occasionally in the literature of the grades, we can draw from it several interesting generalizations. First we note, as was suggested above, that the area of "no answer" is widest from the age of six to the age of eight, that of "wrong answer" is widest from nine to eleven, that of "vaguely right" answers from twelve to fourteen, and that of correct answers throughout the succeeding years. This symbolizes the passage of the wave of development, the transition of words from a condition of no content, through stages of wrong and vague content, to a final condition of precise meaning. Again we can interpret the figure in several ways. We can select any age line, as eleven, and follow it across the diagram vertically to discover that of children at the age of eleven, in the schools of the Red River Valley, 20 per cent. have no meaning for the word "monk," 49 per cent. have a wrong meaning, 15 per cent. have a meaning correct in some respect, and 16 per cent. have a clear and adequate content. Or we may follow the 50 per cent. line, (*but this one only*) across the diagram horizontally, and state that, in general, 50 per cent. of these children have no acquaintance with the word "monk" for two and two-thirds years after the beginning of school age, that they have an absolutely wrong content for the symbol for three years more, that they have a vague idea of its meaning for the succeeding two and one-half years, and that they have a correct content for the word from the fifteenth year onward.

Now let us recall the figure with which this paper was introduced, the figure of the child in a mental fog. The area marked "correct" represents the number of children for whom the word "monk" is located in the circle of clear vision, in the region of intimate experience. The area marked "vaguely right" shows the proportion of children for whom the word occupies the first outlying zone where the fog still obscures its

outlines and swallows up its details. The "wrong" area stands for those children for whom the word is located in the second outlying zone where the fog is dense enough to exaggerate and distort to the extent of producing illusions. And finally the area of "no answer" reveals the number for whom the word lies beyond the dense white wall and is therefore unknown and unheard of. The diagram for "school" represents the same conditions for a word much more intimately related to common experience. Here the fog has thinned and the boundaries are all beaten back, so that the area of clear vision is greatly expanded, the zone of illusion has disappeared, that of dim outlines and obscure features is greatly narrowed, and the invisible region is a mere streak along the horizon. Every school could be mapped out in this way with reference to each new word or symbol that is introduced. At first the area of no content is large, that of correct content very small, and the intermediate regions of intermediate extent. The conscious purpose of the teacher should be to push back these intermediate zones over the area of no content, as in the diagram of "School," and finally to have the area of clear content include the whole.

It is hardly necessary here to elaborate the statement that we have in these diagrams a good symbol of the condition of the mind of each individual. For each of us there are many words occupying a circle of clear vision; there are others which are approaching this circle but are still rendered more or less dim by the intervening fog. Others are so remote as to be distorted or mistaken for words which are familiar and still others are shut from view by the enveloping clouds. The aim of each mind should be to extend the circumference of the inner area at the expense of the others. The diagram for "monk" might represent the mental condition of a person of fair education, that of "school" the mental condition of a person of extensive learning. In the case of the latter there would be no zone of error. If a word is known at all it is known either vaguely or accurately. If in doubt, the scholar consults a lexicon.[1]

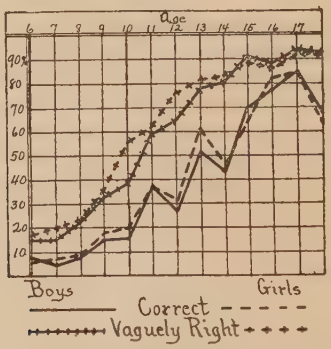
The decrease in the number of correct answers and the increase in the number of vague and wrong answers at the age of eighteen, shown in the diagram for monk, should have a word

[1] Professor Barnes, in his university extension lectures, in drawing the comparison between the above diagram and a school, speaks of it as a garden. The area of "no answer" represents unoccupied ground to be prepared and planted. The "wrong" belt is grown up with weeds which must be pulled out before good plants can be started. The "vaguely right" strip is occupied by plants somewhat sickly and in need of water and cultivation. While the remaining area is full of vigorous and healthy vegetation. The excellence of this figure is at once apparent.

of explanation. This is unquestionably due to the large number of answers from pupils ranging from nineteen to twenty-seven which were classified with the answers of the eighteen-year-olds. It is a universal truth that students in a given grade in school and of an age considerably beyond the average age for that grade, are less developed than those of normal age; hence their answers would be those expected of children much below that grade, and the presence of a considerable number of them would result in a reversion toward a lower standard, — in this case, in more vague and erroneous answers.

Thus far we have spoken of children in general, making no distinction between boys and girls, or between the children of American and foreign parentage. It remains to speak about certain differences due to sex and ancestry.

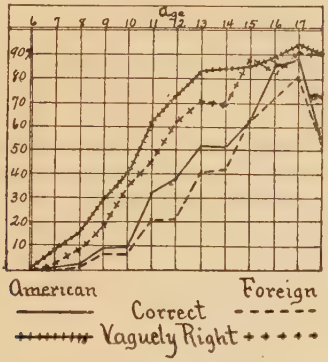
FIG. IV.



In the preparation of Fig. IV the answers for the words monk, peasant, nation, emperor, and armor were combined and classified, the papers of the sexes being kept separate. Only the curves for "correct" and "vaguely right" answers are given, since the others simply reverse the relationship of the sexes here shown. In platting the curves the percentage of "vaguely right" answers were not located with reference to the base line, but were added to the percentages of correct answers for the corresponding age, as in Fig. III. It is of interest to note that the girls excel the boys in the number of correct answers given by several per cent. at almost every age. And when to these are added the percentages for vaguely right answers, the girls' line runs above the boys' line at a slightly greater distance. That is, the girls excel the boys both in the proportion of correct answers and in the proportion of partially correct answers. Is not this what we would expect? Girls are everywhere more attentive to details and distinctions than are boys. The common interests of their lives centre more about

little things. They recognize and obey conventionalities which boys ignore. From the very fundamental habit of their lives, then, they come to recognize distinctions in words which easily escape the boys. The fact that girls are more imitative than boys would also give them a superiority in this respect. The fluctuations in the line of each sex seems to indicate a very uncertain boundary between the areas of correct and partially correct answers, though the upper boundary of the latter area is clear cut for both sexes. Has that uncertainty anything to do with the reorganization and making over activities of the early adolescent years?

FIG. V.



Reclassifying the papers used for Fig. IV on the basis of American and foreign parentage and ignoring sex, we discover the tendencies shown in Fig. V. The superiority of children of American parentage throughout the entire school period is very manifest. They excel in the number of accurate definitions given and are about equal in the number of vaguely right statements. It is altogether probable that this difference is due less to race characteristics than to home customs. Studies of children's vocabularies prior to school age show clearly that children of cultured American parents use correctly a much larger number of words than children of American parents of less culture. And even in school years one's mastery of words depends much less upon his school training than upon home conversation and especially upon home reading. This truth has been brought out vividly in a study conducted in London by Miss Dismorr and quoted by Barnes.[1] Words were submitted by Miss Dismorr to children in two classes of schools, Board Schools attended by children of laborers and small shop keepers

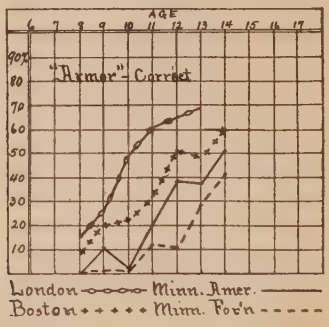
[1] Studies in Education, Vol. II, p. 58.

and Secondary Schools attended by children of middle class homes. Correct statements about the word "peasant" run as follows:

Age.	8	9	10	11	12	13
Board School,	6%	2%	8%	20%	20%	20%
Secondary School,	26	31	41	21	35	43

Nothing but home and social conditions can explain such a difference when all are of English stock. And, similarly, we must look to the home for an explanation of the difference brought out in Fig. V. In many of the homes of the children of foreign parentage little if any English is spoken. In other homes where English is spoken it is very crude and the vocabulary is very limited. Under such conditions the opportunities for enlarging the stock of usable words or enriching the content of many of them are indeed limited. American parentage, especially when cultured, insures practice in good English at home and instruction in it at school. Language is essentially a social product, and, naturally enough, expands most rapidly under good social conditions. About all any teacher can do when such conditions are wanting in the life of a pupil is to stimulate him to constant and free expression of his thoughts and encourage habits of reading good books. In both respects the teacher's example is of supreme importance.

FIG. VI.



Professor Barnes has given us no figures for the word monk upon which to base a comparison of the development of Minnesota children with that of English pupils. But he has included in his study (p. 52) statistics of both London and Boston children for the word armor which serve as a basis of comparison with Minnesota children. In Fig. VI we have curves indicating the relative standings of London children, Boston children, and Minnesota children of both American and foreign parentage, with reference to correct content for the word armor, within the ages studied by Professor Barnes.

This figure could hardly be accepted as typical of the mental ability of English, Massachusetts and Minnesota children in general, for the reason that the word is one very familiar to English people, frequently used in the conversation of New Englanders, but rarely seen or heard in the West. Armor has played an important part in the history of England, and the word is well entrenched in the language of the country. Specimens and relics of armor are found everywhere in museums, antiquarian shop windows, and pictured in histories and juvenile books. We would therefore expect the children of London to excel those of Boston in appreciation of the word armor, and, for kindred reasons, the latter to surpass pupils of western states. In most other comparative studies American children have been shown to be more precocious at every age than their foreign cousins.

If it should be asked what is the most fruitful source of error in children's mastery of new words, we should probably have to answer "euphonic analogy." It must be admitted that this same principle is very valuable in giving the correct meaning of words, especially in that stage of development where roots and stems of words are rising to a prominent place in the clearing field of consciousness. But in most instances with young children this is a misleading tendency. And it is interesting to note that boys are invariably worse offenders in this respect than girls. Instances of answers wrong through euphonic analogy are to be found in the papers quoted above. Frequently papers are found on which almost every statement is simply a rhyme, as, for example, papers 3 and 4. President Hall has called attention to this tendency in his "Contents of Children's Minds" (p. 31 of the reprint by Kellogg). To quote just a few figures from the present study: Of the wrong answers for monk 54% confused the word with monkey or chipmunk, and 12% were due to other resemblances of sound. Of the wrong definitions of the word peasant, 27% were confused with pleasant, 9% with pheasant, and 7% with present. Even the word emperor, which does not easily lend itself to euphonic analogy, owes 33⅓% of its wrong answers to this cause. At the age of six every statement made about monk and peasant was based on a sound resemblance, and at seven from two-thirds to four-fifths of the answers were of that kind. It is unnecessary to quote other examples from this study. A few hours' observation of children anywhere will furnish plenty of corroborative data. The following cases are typical. One small boy complained of having got a *cylinder* in his eye, and wanted to be sent to another school because the pupils in his class had no *ammunition*. A little girl spoke of having begun *dismal* fractions. A half grown boy thought that Joan of *Arc*

was *Noah's* wife. It is evident, then, that euphonic analogy may retard the growth of a vocabulary both by suggesting the wrong content for a word, and by substituting a similar form for a word. Children, like adults, must assort their new material into old pigeon holes, only they are more helpless because they have a smaller number of labeled compartments.

Another common source of error is the visual form of the word. This characterizes older children rather than young ones for the reason that the latter are more likely to be "ear-minded." What adult, even, has not experienced difficulty in the use of such a word as cessation after being familiar with secession. Physiology and psychology, apperception and appreciation, are pairs which have proved a source of difficulty for older pupils, while little tots have been known to be perplexed by such slight resemblances as dog and god, like and kill, lead and deal, did and died. The same tendency to see the old in the new is illustrated by the case of the little girl who read father "fat her" and Stephen "Step hen."

The teacher or parent who looks carefully after these auditory and visual resemblances, to clear them up when they are legitimate and dispel them when they are false, will render a great service in the expansion of the child's vocabulary.

Perhaps the only — certainly the greatest — cause of prolonging the period of vaguely right meaning in the growth of a word's content is over emphasis on some specific application of the word. This emphasis so fixes the particular meaning that the concept is arrested at that point and develops no further. The writer has called attention to this arrest in the development of concepts in another connection,[1] and it is necessary only to illustrate its significance here. A little girl was observed to hold up her pet rabbit by the ears, shake it and exclaim "five times five," "four times four," etc. When asked to explain her conduct she said, "Papa said that rabbits multiply rapidly, and bunny won't do it." How clearly this shows the effect of emphasis on one meaning of the word "multiply." The concept was temporarily arrested at that point, and broader experience was necessary to the resumption of growth. A little girl, aged three and a half years, was found by her mamma with a pair of scissors stuck away back into her mouth. In answer to an excited inquiry she replied that she was "cutting her wisdom teeth," an expression used by a servant in her hearing the previous day. Many of the papers examined in this study, especially those of children of the intermediate and grammar grades—corresponding to the period when interest in reading is developing — make statements which show that the

[1] American Education, November, 1903, "Children's Political Perspective," p. 147.

meaning of the word depended upon a single incident, sometimes only distantly related to the essential content. The following quotations from the papers are typical of this class: "I mean by the word 'Armor' a man who owns a packing-house." "A peasant is a farmer in Holland." "Monk means a kind man that lives on mountains and rescue the lost travelers." "A emperor is the ruler of Germany." "A monk is a man who hunts people that are lost."

When a concept is discovered to be limited by a single incident or example or quality of the full content, care should be taken to complete the connection between this small corner of content and the greater body, and to vary the use of the word sufficiently to bring out all the common applications.

Finally, what use can be made of the conditions revealed by this study in our actual school contact with pupils. President Hall has shown the woeful lack of content for the commonest words in the minds of children entering school. Professor Barnes's study and the present one emphasize the error and vagueness in the content of words commonly found in school literature, and have pointed out certain principles of development toward a correct meaning. Can we lay down any pedagogical rules which will enable a teacher to hasten the growth of her pupils along this line? In general, yes; in detail, no. The use of a dictionary for each new word might be urged, but the dictionary can be of assistance only where experience can interpret the dictionary. A child may learn from the dictionary that an emperor is a monarch, or the head of an empire, but unless his experience has made him acquainted with the synonyms he is no wiser than before, — indeed he may be all the more bewildered and perplexed from the very number of meaningless symbols. Those of us who were in the public schools twenty-five years ago will recall what a vast amount of time and enthusiasm was killed in worse than useless dictionary work in connection with reading and spelling.

Professor Barnes calls attention to the need for some parallel to the method by which scientific terms are made clear to students of science. It is true that there is much less haziness in the meaning of science words than in those of a purely humanistic or literary use. In science pupils are brought into contact with the realities which lie back of the terms, and the meaning expands rapidly to its full significance. With words of general literature this is not true, and many of them remain but vaguely defined for a lifetime. The old development lessons were a lame attempt to meet this difficulty, but they failed because they overlooked the principle that you cannot develop out of a child's consciousness what does not already exist there in embryo. Meaning can come only from experience, and when experience is wanting no amount of "development" will put

significance into a symbol. Professor Barnes has spoken of the use of pictures as a substitute for realities which cannot be experienced. And with our present facilities for producing and distributing the finest art reproductions at slight cost, there is no reason why pictures should not become a fruitful means of adding content to otherwise lifeless symbols. Dramatization is also coming prominently into use in primary schools as an instrumentality for giving life and richness of content to the new spoken and written symbols which are thrust in such numbers upon the oft'-too-passive child.

The commonest and perhaps the best way to promote the growth of content in words, is to allow the child to infer the meaning from the context. That is the way we all learn language in the beginning. Meanings come to us as babes in that way, long before we can utter their symbols, and any other method must be but a substitute for or an abbreviation of this. So long as the number of new words is small, and their use in the context is sufficiently varied, there will be little trouble for the pupil in getting the sense. For an alert teacher it is an easy matter by questions, varied illustrations, and informal but well directed conversations, to clear away any uncertainties that may arise in connection with the ordinary new word. The dictionary will give help, too, but must not be allowed to serve as a substitute for experience. The greatest difficulties will arise, of course, in the minds of pupils from uncultured homes where the daily conversation furnishes no assistance. For such the teacher can only increase her vigilance, extend her individual attention, question and illustrate more fully, and most of all encourage them constantly in the reading of books that will quicken the growth retarded by home conditions.

The one truth that every teacher must hold in mind is that no concept comes to a child perfected. He may master the pronunciation in a single attempt, but the meaning of the word lags behind. Before it can be clearly known it must be vaguely known, and the teacher must allow time for the fruition; "first the blade, then the ear, after that the full corn in the ear." Whenever a new word is introduced some members of the class will be found in a fog of greater or less density. In the case of the word monk 24% of these pupils were in a fog as late as the age of seventeen. At the age of twelve 82% were befogged, and at seven 98% had their mental vision beclouded. All of these children needed help of various kinds and in varying degrees. The best way to extend this help no one can prescribe independently of the child, the word, and the situation. It is for the teacher, knowing how meanings grow, to discover the extent to which the content of the word is obscured for each child, and to devise the best means of bringing that word into the area of clear vision.

AN INTRODUCTORY STUDY OF THE PSYCHOLOGY OF FOODS.[1]

By SANFORD BELL, Fellow in Clark University.

The raw material which forms the basis of this study was collected by the questionnaire method,[2] through the circulation of three syllabi. The first one was No. XIII, of the series of 1895, issued by Dr. G. Stanley Hall and covered the following points:

1. What signs do young infants give of (*a*) hunger, (*b*) of satiety, (*c*) of distinguishing natural food from mother from wet-nurse, (*d*) milk of different cows, or differently sweetened or otherwise prepared food, (*e*) of discriminating between other artificial foods (Mellen's, etc.)? What changes in either enjoyment of the act of feeding, or in appetite, sleep, digestion, disposition, etc., have you observed in infants due to changing them on other foods? Which is best and worst, and why? How would you modify current practices or your own previous use, add why? Describe the hungry cry.

2. *Describe* the phenomena of weaning, its dangers, requirements, proper age, etc. How is the best way to change to solid food? Frequency, night feeding, etc.?

3. Give correct cases of the tendency of infants to bring everything to their mouth. Describe the phenomena of teething, its beginning, symptoms, end, dangers, etc., and children's tending to like hard things.

4. Enumerate all the unnatural things young children eat or taste, munch, nibble, or chew, as birch bark, shoemakers' wax, grape-leaves, grains of corn, wheat, etc., honeysuckle ends, dirt or sand, flies, worms, buds, various forms of filth. Describe their experiments in making unusual mixtures of edibles, as molasses on potatoes, and in making drink from herbs, roots or leaves. What do they tease to taste, as soda, spices, dough, vinegar, medicines, chalk, slate pencils, etc.? What do they smoke, as rattan, grape-vine, mullein, chestnut-leaves, dock-seed, etc.? What do they carry in their pockets to bite? Ask country children what plants are good for greens, to cure and prevent disease, etc. Let the children write lists of all they ever tasted, drank, ate, etc.

[1] I wish to acknowledge my indebtedness to Pres. G. Stanley Hall for suggesting this problem to me and for his helpful and sympathetic counsel during my work upon it; to Miss Lillie A. Williams, New Jersey State Normal School, for replies to the first syllabus; to Dr. F. N. Seerley, International Y. M. C. A. Training School, Springfield, Massachusetts, and to Dr. J. F. Bucher, Waynesburg College (Pa.), for replies to the second syllabus; to Supt. L. P. Nash, Holyoke, Mass., and to Asst. Supt. Ida Gilbert Meyers, Washington, D. C., for replies to the third syllabus.

[2] Theodate L. Smith: *Ped. Sem.*, Vol. X, pp. 405-410.

5. Ask each child to state its *favorite* kinds of confectionery, and also its favorite deserts and drinks, and why.

6. Ask each to list the kind of food and drink it prefers, and also those it hates, and why.

7. Have you observed in children excessive or exceptional appetite for any particular food or drink, as tea, coffee, gum, candy, soda water, beer or cake, spiced foods, meats, etc., that were hard to control? Describe such children, and the growth and treatment of this tendency. What is the cause, symptoms and effects of daintiness, of having a "sweet tooth," delicacy of appetite, junketing? *Leckeresi Näschersei*, or their opposites, voracity, omniverousness, effects, causes, of great, little or fluctuating appetite (picæ, polyphagia, anorexia)?

8. How would you treat these *picæ* or whims of appetite in children that make certain good foods repulsive and even nauseating? Should these aversions be overcome and all the common foods be insisted upon? Would you insist on *regularity* in kinds of food, *i. e.*, the same dishes recurring daily and weekly? Would you insist on much coarse food, hard to chew, or on much plain food, hard to digest, or on a dietary largely vegetable, or enforce milk-drinking? Make suggestions as to children's dietaries. What changes in appetite for food and drink occur at adolescence?

9. State your opinion concerning school lunches. Should schools furnish them warm? Should there be a lunch counter? Is fasting occasionally good?

10. Describe concretely, in an individual case, the development of a propensity for tobacco, alcoholic drinks, for any form of opiate, of morphia, teaisms, coffeeisms, the cocoa habit, etc., with causes, effects and treatment.

11. Describe any modifications in appetite for food or drink in either sex at adolescence, and also in old age.

Always state age, sex and nationality.

One hundred sets of very carefully prepared answers (86 women, 14 men) to this syllabus were sent in from the New Jersey State Normal School, by Miss Lillie A. Williams. This material was found to be exceedingly valuable for its facts and suggestions. The second syllabus, a supplementary one, issued by me in January, 1903, was as follows:

1. Is a child's appetite a safe guide to the amount and kind of food which he should eat? Give reasons for your answer.

2. How does a child's appetite change as he grows older throughout life? Give full details about the changes, and specify at what ages they come.

3. Have there been periods in your life during which your appetite craved chiefly vegetables? Meats? Sweets? Acids? Fats? State particulars, indicating your age at the time.

4. What changes did you notice in your own appetite for food and drink at adolescence? What observations have you made upon others in regard to these same points?

5. Give instances of specific foods which you have at one time liked and afterwards grown indifferent to, or formed an aversion for, or *vice versa*. State the cause of the change and your age at the time it occurred.

6. Do you drink coffee? Tea? When did you begin it? What effect does it have upon you at the time of drinking it? What effect upon your general health?

7. What do you think is the cause of *whims* in eating or drinking? Of *aversions?* Give illustrations. Can they be overcome? Should they? Give suggestions.

8. At what time in your life did the æsthetic appearance,—the color, form, etc., of food begin to affect you? What importance do you attach to it now? What effect do fine China, beautiful table linen, agreeable surroundings and pleasant company have upon you?

9. Have you found a special value or harm in one or more kinds of food or drink? Give details.

10. Does poor, insufficient or badly cooked food impair efficiency in mental work, *e. g.*, in students? or in physical work or growth? Does it cause a craving for stimulants?

11. Give instances of young people who have forced their appetites in amount and kind of food for theoretical reasons, such as to live long, to be strong, to avoid disease, etc. Tell the source of their ideas.

12. Give instances of voracity in children. What causes it? What are its effects?

13. Give anything you know about the peculiar appetites of old men and old women.

14. What effects have the season of the year, latitude, occupation, sex, and temperament upon the food one eats?

Give your name, age, sex and occupation.

In reply to this supplementary syllabus 91 sets of answers were received from men and 102 sets from women. To neither of these syllabi were there enough sets of answers for statistical tabulations of any value. There were enough, however, for very valuable suggestion. The second supplementary syllabus is to be found on page 75.

Nowhere in the entire field of comparative psychology are the facts that are true of the individual more heavily freighted with suggestions concerning facts that have been true of the race than in food psychoses. Nowhere are ontogeny and phylogeny more closely and organically connected. This is necessarily true, since the food instinct is the oldest and most fundamental of all of the instincts, and since nutrition is probably the most fundamental thing about life. The instinct itself has carried over throughout evolution, remaining the least changed of all instincts in its own nature, yet the basis of all changes, directly or indirectly, in structure and function in the whole realm of life.

Hunger. Although hunger is the first of the highly specialized feelings to assert itself, it is not present to any appreciable degree at birth.[1] The child has fed upon the amniotic fluid[2] before birth[3] and at that momentous event the breathing, temperature and contact adjustments take precedence over the demand for food. It is not until several hours that the need of nourishment makes itself felt. Miss Shinn's niece was comfortable and well without food for more than forty-eight hours after birth.[4] There are considerable individual differences

[1] Perez: First Three Years of Childhood, p. 9.
[2] Houzeau: Etude sur les Facultés Mentlaes des Animaux, t. i., p. 193.
[3] Preyer: The Senses and the Will, pp. 116, 152.
[4] Milicent Shinn: Notes on the Development of a Child, p. 211.

among children as to the time after birth at which manifestations of hunger show themselves. It is not customary among civilized or uncivilized peoples to feed the child immediately after birth. Among the Tlingit Indians,[1] of Alaska, the newborn infant is not given the breast until all the contents of its stomach (which are considered the cause of disease) are removed by vomiting, which is promoted by pressing the stomach. The Songish Indians do not give the child anything to eat on the first day, and among the Hare Indians, the infant is not allowed food until four days after birth, in order to accustom it to fasting in the next world. After hunger has asserted itself in the healthy new-born it is by far the strongest, the keenest and most imperative of all of its normal feelings. It is the most persistent of the early distinguishable sensations and recurs the oftenest. Eating constitutes the chief activity of the waking hours of the child during the first weeks of its life. The almost constant presence of hunger during these first weeks is due to the small amount of nourishment which the infant can take at one time, and to its rapid assimilation. The smaller the stomach the sooner it becomes empty, with consequent hunger. According to Beneke, the healthy new-born infant's stomach holds only thirty-five cubic centimeters; it grows very rapidly and after two weeks, it holds from one hundred and fifty-three to one hundred and sixty cubic centimeters; after two years, seven hundred and forty. At the beginning of life, the average time between meals is about two hours in the daytime and somewhat longer in the night time. By the fifteenth week the periods between meals should normally be lengthened to three or four hours. During the first weeks it is not unusual for the normal child to require to be fed from two to four times in a night of from seven to nine hours. By the eighteenth week a whole night of ten to eleven hours may be passed without the taking of any nourishment at all, though the midnight meal is not usually given up till the last quarter of the first year. By the time the child is one year old it may safely have the habit established of taking five meals a day. The matter of the child's temperament, the amount and kind of activity, and other conditions that affect the appetite should be taken into account by the parent and no rules adhered to too stringently, in regard to the time of feeding and to the amount given.

The entire behavior of the child shows how intensely keen the feeling of hunger is, which certainly has the right of way over all other feelings in the normal child. Not until the fifth month of its life was Preyer able to divert the attention of his child temporarily from taking its food, by means of new noises

[1] Chamberlain: The Child in Folk Thought, p. 147.

and movements. Here again, however, are to be found considerable individual differences, depending upon the sex, vigor and habits of the child. Miss Shinn was able on the forty-seventh day to divert her niece completely from hunger for a period of ten minutes. All of the material given by Miss Shinn upon hunger and taste, in her notes upon the Development of a Child, must be interpreted in light of the fact that the hunger of the child was nearly always anticipated by feeding and that there were systematic efforts put forth to restrict the interest in taste sensations from becoming absorbing. (p. 172). Once in the ninth month when the time came and for some reason the nursing was postponed after the mother had taken the child, it manifested its eagerness and hunger by crying for the breast. During the first nine months the healthy child's feeding is hurried and gluttonish. During the third and fourth quarters of the first year, feeding takes relatively less time than during the previous quarters; the intervals between the meals have become longer, the meals less frequent, the hours for sleeping fewer, thus giving the child more time to turn its attention to other things than food. Nevertheless food experiences furnish the root psychoses of its life and the mouth is its first psychic centre.

There is an organic relationship between attention and hunger as early as the sixth week. Preyer found that if he busied himself too much with his child, if he allowed too many sense-impressions to act upon it, if he brought too much strain upon its attention, hunger arrived unseasonably, accompanied by fretfulness. Miss Shinn had the impression that as a rule hunger was hastened by an excess of occupation of the brain and senses.

Signs of Hunger. Preyer reduces the unmistakable sign of hunger that is present soon after birth, to that of sucking, after objects capable of being sucked, have been placed in the mouth. He proved many times, to his own satisfaction, that the sucking reflex could not be set off when the babe had enough. While the act of sucking under such conditions may be the unmistakable sign of hunger, there are many other manifestations, whose chief, if not sole meaning, lies in their relation to this feeling. From the observations reported by eighty women and fourteen men, I find mentioned the following signs of hunger, manifested by infants; the cry; the sucking reflex,—with nothing in the mouth, or with its fingers, fists, clothing, bedclothing, or anything in its mouth that it can get to it, or get its mouth to; smacking the lips, pursing the lips, puckering the lips; opening the mouth when touched anywhere upon the face; puckering the face; wrying the face; rolling the head from side to side, moving the arms as if in search of the breast,

moving the hands for the same purpose, clutching the clothing or hair of the mother or nurse, clenching the hands, holding the hands as if reaching for something; kicking, squirming, fidgeting, tossing, moving the arms, the legs, the whole body vigorously. Many of these are not present immediately after birth but all appear within the first year.

There is a system of hunger reflexes which starts with the most highly specialized one of the group, namely that of sucking, and spreads until it encompasses the whole body. By the law of parsimony it stops with the sucking reflex if that is sufficient to get the food that satisfies the feeling back of the reflex. If this initial act fails, the spread in agitation continues until the whole series is run. It is practically impossible to divert the massive, protoplasmic, systemic attention of the infant manifesting itself in these actions except by food. The difficulty of diverting the child from its food is still to its advantage, since the child's survival depends upon its sense of hunger being satisfied. It was vastly more important in the earlier periods of racial development, before mother love and solicitude were developed, when the child's life literally depended upon the persistence of its demands for food.

The cry of hunger has its distinctive stages of development. At first it is purely reflex and soulless, and is merely the instinctive, animal, mechanical announcement of hunger. In its second stage it has in it the residue of experience, and shows a degree of intelligence sufficient to use one kind of cry to attract the attention of the mother when she is near and another when she is relatively remote. In its third stage, it frees itself in language, proper. In its first stage it is easily distinguished from the cry of pain or the cry of exercise. It is more prolonged and intense than the latter, and less violent and vehement than the former. It does not continue so long uninterrupted as the cry of pain, coming as it does in long and short intervals. The voice, too, has a different ring; the cry of pain is higher than that of hunger, the compass of its scale is greater, the quality of its energy intenser. The latter cry is intended more to announce an emergency than the cry of hunger, and for that reason has received its piercing, energetic quality from natural selection. "When the child cries from hunger, its eyes are usually tightly closed; when it gives a cry of joy, they are open. Moreover, my child, when crying with hunger, used to draw back the tongue and spread it out; this does not take place in other kinds of crying,"[1] As soon as the child begins to notice, the cry of hunger gains in definiteness and variety of character. With the establishing of the association between the

[1] Preyer: The Senses and The Will, p. 249.

feeling of hunger and the mother or nurse as the occasion for satisfying it, the cry differentiates into two relatively distinct ones. One in her presence, when the child is aware that she is near. This is a fretful, coaxy, little staccato cry. The other is of a different rhythm,—a longer drawn, louder and more vehement cry; a solicitous, sometimes demanding, but not coaxing cry. When the first kind is made in the mother's presence and fails to attract her attention, it is followed by the second which is a stronger stimulus and one not so likely to go unheeded. The fundamental significance of the cry of hunger is that it shall successfully attract the attention of the mother.

It is very interesting to notice, as I repeatedly have done, this system of hunger reflexes begin with the limited and highly specialized one of sucking, with a small and definitely located area of agitation, and spread gradually, but may be rapidly, until every organ in ths child's body is highly animated and its every movement is centrifugal; then when the nipple is placed in its mouth see all of these diffused movements arrested, and the intensity of its life at the time funnelled through the reflex with which the round of activity started. I believe that such an experience is both physiologically and psychologically beneficial to the child if it is not unduly prolonged. It increases circulation, causes a different distribution of the blood, accelerates some of the secretions, heightens the entire tonicity of the body and no doubt helps neurologically to connect previous experiences in a new way.

All of these movements manifestly find their significance in attracting the attention of the mother, and have their origin in the species far below man. The cry appeals to the mother's ear; the movements appeal both to touch and to sight, more particularly to touch; the clutch, once useful in holding on to the mother while she was in motion, is neither entirely lost nor useless, now; the exploring movements of the hands and face point back to a time when the child had to find its mother's breast or starve; the more vigorous kicking, fidgeting, squirming, floundering, added to the cry produced a summation of stimuli sufficient to arouse the mother from sleep, preoccupation or animal inertia.

Preyer and others have observed that the reflex excitability of the child is increased during the condition of hunger. This is very significant on the phyletic side. The same thing is true in general, in the animal world, and as true of adults as it is of the young. All of the senses are quickened, the entire life of the creature heightened (if hunger has not gone too long), the chances for perceiving its food are multiplied, and, moreover, since the animal is most exposed while moving in search or pursuit of its food, it is just as important that the chances for

detecting its enemies are likewise multiplied. On the other hand general sensibility is lowered while hunger is being satisfied. This is partly due to preoccupation and partly to the metabolic changes which feeding occasions.

Another sign which I have observed in a number of infants is that of moving the face about, after the nipple has been taken into the mouth. This is particularly true when the supply of nourishment is scant. It is akin to the hunching of the calf, colt, and pig, and to the kneading of the breast by the kitten and the squirrel, and serves to stimulate the mammary glands to more profuse secretion as well as mechanically to assist them in their functioning.

The swallowing reflex is ready to function at birth. According to Preyer and Houzeau it functions before birth, and Kussmaul thinks that hunger and taste may both be stimulated by swallowing the amniotic fluid. The sucking reflex is, however, not always perfect at birth, and not infrequently does an infant require a number of successive stimulations of the lips and tongue by the nipple to set it off. After the nerve centres that control the reflex are ripe enough for it to function normally, the feeling of hunger alone is sufficient to start it going. It is also easily set off by mechanical stimulation. My own observations do not agree with Preyer's in support of his statement that "the babe that has had enough does not suck." This may hold true immediately after its hunger is appeased and while the centres that control sucking are fatigued, but the action can often be started after a few minutes of rest. An infant that has dropped to sleep with the nipple in its mouth after a bountiful nursing will sometimes resume the action of sucking when an effort is made by the nurse to remove the nipple. There is some pleasure in the mere action of sucking, and a child that is restless through hunger may sometimes be temporarily appeased by sucking an artificial substitute for the nipple. This is simply taking advantage of an economic association which natural selection has established. As a rule hunger is satisfied during the time that sucking is going on, and certain inhibitions take place as a result. When one of the elements of the association is experienced it is natural for the others to follow. After the child has learned to discriminate between the nipple and the substitute this device of dispelling the restlessness of hunger will not work. In any event it will work for a short time only. The sucking instinct fades with weaning and entirely disappears from most children, although in some it lasts in a weakened form throughout life. It is reclaimed in a number of sexual and other perversions in adults.

Satiety. If hunger and thirst are the greatest discomforts of

the healthy infant, their satisfaction is his greatest pleasure. The presence in the stomach of the normal amount of food at one feeding works a very great transformation in the child. The food and the objects connected with it, which before feeding excited the keenest interest and desire, are afterwards treated with indifference and literal disgust. In passing we may say that he never reaches an age in life when eating a good meal may not change, very materially, his attitude toward things. Satiety does not always come after feeding. In fact if the feeling of hunger is regularly anticipated by feeding, and its keenness kept from asserting itself and driving the child to relatively excessive eating, it may rarely occur. The signs of satiety are first, general inertia. Instead of being dynamic, as it was before feeding, the child is lethargic, inert, relaxed and drowsy. Other indications are seen in the removing of the nipple from the mouth by the lips and tongue, and allowing the milk which it was too full to swallow, to flow out of the mouth. These are the signs that belong to the first months. By the sixth or seventh month other signs more vigorous and positive are added, *e. g.*, turning the head away, throwing the head back, pushing the breast or bottle away, throwing the food down, spitting food out of the mouth, etc., and by the end of the first year I have seen anger and rebellion manifested when the parent or nurse insisted upon more food being taken than was wanted. If, however, the healthy child is allowed to be its own judge of the amount which it should take, it usually settles down after feeding, overcome by comfort and drowsiness, with a look of satisfaction,—sometimes a broad smile well distributed over the features. If it is old enough to remain awake after feeding, the drowsiness usually gives way to good-natured playfulness with an attention easily controlled. Sometimes an infant will go to sleep after sucking vigorously at a scanty breast, on account of fatigue and not of satiety. Under such conditions the child is liable to be underfed and peevish, the mother not knowing that her supply of milk is insufficient, taking the child's sleep as evidence of enough food at each nursing. Peevishness and restlessness in the child are usually very good indications that the food supply needs investigation.

Miss Shinn agrees with Kussmaul that the child can experience nausea. She observed an unmistakable case of it in her niece in the tenth month. This is contrary to Preyer's observations.

Through the primitive function of sucking, the mouth early develops into a grasping organ, preceding the hand in this regard by several weeks. According to Miss Shinn the first grasping by the lips occurred in her niece in the fourth week,

while the first active grasping by the hand occurred in the tenth week. The area of active grasping by the lips is largely increased in the fifth week by the co-operation of the groping movements of the head. A similar co-ordination is made between the active grasping by the hand and the groping movements of the hand in the twelfth week. Up to the twentieth week, the active grasping by the mouth, assisted by the groping movements of the head, is more frequent and skillful; after the twentieth week grasping by the hand aided by arm movements takes precedence over mouth grasping. Simultaneous grasping by the mouth and the hands takes place about the twentieth week. The correlation of these two activities with sight occurs in the same week. The following is the sequence in the development of mouth grasping: (1) Sucking reflex, and special sensibility in the lips and tongue at birth; (2) seizing with the lips and sucking a surface brought in contact with them (fourth week); (3) groping movements of the head to aid in mouth grasping (fifth week); (4) appearance of active touch in the tongue (seventh week); (5) diving the head down to the object wanted in the mouth (twelfth week); (6) attempt to grasp with the mouth or tongue by visual guidance (seventeenth week); (7) grasping with mouth aided by diving the head to the object more frequent and skillful than grasping by the hand (nineteenth week); (8) simultaneous grasping with the mouth and hands (twentieth week); (9) mouth grasping begins to disappear and transition made to hand grasping (sixth month). The sequence of stages in the development of hand grasping, as related to mouth grasping, is as follows: (1) reflex clasping (at birth); (2) hands often felt by lips and tongue, in connection with certain involuntary movements of the arms (tendency of arms to take prenatal position, and accidental movements from birth); (3) renewal of these sensations sought by voluntary repetition of arm-movements (thirteenth week); (4) sensations increased and varied by touch of objects, accidentally brought to the mouth after being mechanically clasped (fourteenth week); (5) deliberate groping for and laying hold on familiar objects, in a familiar place, to carry to the mouth, *i. e.*, repetition of movements that have often resulted in accidentally carrying things to the mouth: extension of association series (sixteenth week); (6) hands and objects seen, while grasping takes place,—addition of visual associations (sixteenth week); (7) grasping at objects visually located, for the sole purpose of carrying to the mouth (seventeenth week); (8) grasping for varied purposes, —manipulation, inspection, etc. as associations increase in number and variety (twenty-first week); (9) hand grasping the chief interest, and skill in this passes skill in mouth grasping (sixth month).

The mouth is also the first organ of touch. Special sensibility to passive touch is present in the lips and tongue at birth. Active touch appears in the lips in the fourth week and in the tongue in the seventh or eighth week. Active touch appears in the fingers from the twelfth to the fourteenth weeks. From birth there is the tendency present for the arms to take the prenatal position. This often brings the hands to the mouth, and when this is done they set off the sucking reflex. Flexion movements are earlier co-ordinated than extension movements. At first the hands, empty, are brought to the mouth, then the hands after reflexly grasping a thing are brought to it (this about the tenth to twelfth week). This results in the association between the movement and touch sensations in the lips and tongue, and is followed in the thirteenth week by deliberate efforts to put things in the mouth. These co-ordinations are reinforced by the sense of sight, and by the end of the fifth month or the beginning of the sixth, not only are objects guided to the mouth, but the mouth is guided to objects, after which the number and variety of things mouthed is alone limited by his environment and the range of these movements. With the advent of creeping the child's horizon is greatly enlarged, soon to be followed by an indefinite extension of his world through walking.

The following is a list of things taken from the one hundred reports given to me, which children yet in the creeping stage have been observed to put in their mouth, or put their mouth to: blocks, bird-lime, bark, bits of iron, brushes, buttons, books, bones, bugs, beetles, bibs, buckles, bell, broom, corn, cat's paws, clothes-pin, clothes, cocoanut-shell, chicken's foot, chicken's feather, chicken's head, chicken-lime, coal, coal-scuttle, coal-tongs, chair, chair-round, cradle, rocker, cradle cover, comb, cuff, cuff-holder, collar, doll, duster, darning-egg, excretion, fingers, face of nurse or mother, fork, fan, finger-rings, flies, fruit, foot-ball, flowers, grass, grandaddy-long-legs, grain, glove, hair, hands, hammer, hair-pins, hat, knife, kitten's ears, kitten's tail, loose plaster, leaves, lamp-chimney, leather, marbles, mitten, money, mouse-trap, melon-seed, nails, needles, neckties, necklace, orange, plate, pins, parts of chair, potash balls, paper, pencil, pictures, pumpkin-seed, parasol, rubber rings, rattle, rags, rope, roots, rubber tube, spoon, sand, stones, shoes, shoemaker's wax, sad-iron, stove-hook, sticks, switch (of hair), strings, spools, soap, toes, thumb, toys, table leg, table-cover, thread, veil, whistle, weeds, worms, wood, watch.

This conspicuous tendency to put things in the mouth, which appears with the first co-ordination of the flexor muscles of the arm, and which becomes a consuming occupation as soon as creeping and accuracy in grasping are acquired, certainly finds its explanation in the remote past. Miss Shinn[1] refers "it more to the touch interest and to ancestral habits now become

[1] Shinn: Notes, p. 213.

meaningless than other observers have done."[1] Preyer[2] speaks of it in the following words: "Probably we have here a case of primitive logical inference; up to this time the sucking and tasting were the most important strong pleasant sensations the young being has known; when, therefore, he has a new, agreeable sensation (*e. g.*, of a bright color, a round, smooth body, a soft surface), it is brought into associations with the lips and tongue, through which the pleasurable feeling at taking in the milk was received." Dr. Louis Robinson[3] seeks to account for it by referring it to the habits of life of primitive people as far back as the cave-dwelling period. "In earlier times the child had to get along with the debris of food on the floor of the cave and around the resting places."[4] The picking up and putting everything into the mouth is a general tendency passed along by heredity just the same as pecking is a general tendency inherited by chickens.[5] Both have to undergo modifications by discriminations learned through experience. At the time that this tendency became a racial memory, it was safe for the child to put everything into its mouth, since only those things that were good for food were brought into the cave or to the resting place. Only those children survived who were strenuous and persistent enough to pick up their living in this way. The persistence of the tendency under conditions that bring the child in contact with things that may be injurious is to a degree dangerous, although the experiences so obtained form, to a very large extent, the root psychoses of his life. The returns contain records of three deaths caused by eating such things as lye, paris green, etc., while a number of serious injuries are reported through swallowing buttons, pins, buckles, whistles, thimbles, medicines, weeds; others were injured by breaking glass in their mouth. Nearly all of these instances are concerning children between the age of three months and a year and a half.

As a matter of course, many of the things which are put into the mouth are actually eaten. This is especially true after the beginning of the second year, at which time the sense of taste acquires greatly increased value and interest to the child. There seems to be little ability to discriminate between things that are edible and those that are not. The impunity with which the most unnatural things are swallowed by the child between two and six years of age is astonishing.

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[1] Sully: Studies in Childhood, p. 402.
[2] Preyer: Senses and Wills, p. 249.
[3] Dr. Louis Robinson: Primitive Child, N. A. Rev., Vol. CLIX, pp. 467-478.
[4] Chamberlain: The Child, p. 231.
[5] Lloyd Morgan: Animal Behavior, p. 93.

The following is a list of one hundred and eighty-two more or less unnatural things which children have been known to eat, given in the order of frequency mentioned in the returns: birch-bark, honeysuckle, dirt, sorrel, wheat, sassafras-bark, green fruit, corn, grass, grape tendrils, fruit-tree gum, flowers, coal, clover-heads, leaves, rose-leaves, rose-petals, sand, shoemaker's wax, grape-leaves, flies, coffee-grounds, paper, bees-wax, mallow, rubber, licorice-root, mud, slippery-elm, pencils, buds, cinnamon-bark, sassafras-buds, acorns, pea-pods, caterpillars, cloves, wintergreen-leaves, wintergreen-berries, nasturtiums, morning-glories, excretion, sassafras roots, candle ends, parched corn, stones, peach pits, green apples, sweet-cicily, wild-cherry leaves, rotten apples, buckwheat, chinquepins, wax, azaleas, rye, spicewood, timothy hay, raw potatoes, raw pork, ink, cord, corn-silks, may-apples, hair, orange-peel, lemon-peel, grape skins, apple seeds, pitch, coal-tar, bitter chocolate, spruce-gum, rhubarb, pins, feathers, stems of weeds, sealing-wax, milk-weed, stems, clover butts, primrose, bran, shorts, corn-meal, cobs of young corn, linseed meal, yellow-wood sorrel, apple leaves, peach leaves, grain stems, pine-ivy leaves, daisies, green pears, wild onion leaves, roots, finger nails, callosities, seeds, fly-poison, snake-root, Indian turnip, mulberry leaves, chalk, punk, skunk cabbage, scrapple, vinegar, birch-buds, celery leaves, barley, rabbit "berries," nannie "berries," ground cherries, raw sweet-potato, raw fish, paste, camphor, sponge, lead, mosquitoes, raw beans, tallow, cork, book-binding, corn-cobs, straw, leather, cloth, soap, "daddy" nuts, thread, rags, rubbish, bark, raw turnips, wood, vanilla, mouse-ear heads, currant blossoms, green currants, green peas, shrub petals, pumpkin seed, sunflower seeds, castor beans, partridge berries, sumac-berries, babywood, columbine, peppermint, fennel seed, artichokes, meat-rinds, thimble, sweet brier, tea leaves, apple-blossoms, geranium leaves, oxalis stems, "old man," mountain mint, choke-cherries, sand-cherries, lye, egg-shells, mustard leaves, paris-green, pepper-grass, catnip, spearmint, quince leaves. If we throw these things into groups and rank them by per cent. in popularity among undiscriminating infants, we nevertheless find a suggestive order. Leaves and tendrils have a per cent. of 73; flowers, 59; barks, 49; grains and meals, 44; dirt, mud, sand, rubbish, coal, ashes, etc., 43; paste, punk, chalk, feathers, pins, ink, buttons, paper, cord, lead, rubber, cork, etc., 36; gum, wax, sealing-wax, fruit-tree gum, pitch, tar, etc., 34; green fruit, 30; grass, hay, straw, stems, etc., 29; ripe fruit and berries, 21; roots, 18; buds, 17; flies, bugs, worms, caterpillars, mosquitoes, etc., 17; hair, skin, finger-nails, refuse, etc., 12; raw vegetables, 11; peelings and skins of fruits and vegetables, 9; seeds, 9; raw meat, 4; and poisons, 3.

The ease with which many of the utterly indigestible things pass through the child without injury to him, is perhaps due to the fact that the alimentary canal is relatively free from constrictions during infancy, and to the relative vigor of all of the eliminative processes that accompany the digestive vigor of the rapidly growing organism. In attempting to give an explanation of this irrepressible impulse to promiscuous eating, the facts must be correlated with the ontogenetic development of taste which makes its first acceleration in the second year, with the phenomena of teething, with an almost insatiable appetite and with the earlier tendency to put everything in the mouth. These are all mechanisms of the general instinct of nutrition

present in all animals and which in most of the species must be educated through experience. It seems to be a general principle that the higher the animal is in the scale, the selection of the particular things to eat is left less and less to instinct *per se* and more and more is demanded of experience.[1] The suggestion of racial atavisms as an explanation of certain preferences is certainly very strong. According to Chamberlain,[2] "alimentary atavisms appear, *par excellence*, in the little child of the modern civilized races, who is vegetarian in his early years, delighting in all sorts of plants and leaves, fruits and berries, things sweet and sour." Again, the same author in referring to the tendency in children to eat dirt, says: "'Dirt' or 'filth atavisms' are represented by the kneading and modelling of one's own excrement, a practice often observed in monkeys and in children belonging to the races of highest culture and social development, and not unknown among even educated adults, for the field of pornomania is indeed a wide one; also by like procedure with other dirt and filth."[3]

Teething. Synchronous with these phenomena, and interrelated with them, are the phenomena of teething. Teething begins usually about the fifth month of the infant's life and really continues in some form until the acquiring of the wisdom teeth in the 17th or 18th year. The phenomena which concern us most here, are those attendant upon the getting of the milk teeth which is completed about the end of the second year. There are other physiological changes connected with these changes which we must note. "Toward the end of the second year all of the milk teeth have cut through and the digestive functions have greatly increased in power. The lower maxilla become stronger, the muscles of mastication more powerful, the cavity of the mouth larger, the lips more fleshy, the esophagus wider; the salivary glands are better developed, and secrete a larger quantity of saliva; the shape of the stomach changes, and its walls grow thicker; the intestinal canal longer and more capacious; in short, all the digestive organs are more adapted to an animal diet. At this period milk alone could not satisfy the child." (Ammon.)

The phenomena of teething fall into the following groups, with no fast lines between them: (a) physiological, (b) pathological, and (c) psychological. These are indicated in the returns as follows: (a) physiological,—the child begins to drool, to press the gums together, the gums become elevated because of the pressure of the teeth beneath; the teeth erupt

[1] Lloyd Morgan: Animal Behavior, p. 93; also Introduction to Comp. Psy., Chap. xii.
[2] Chamberlain: The Child, A Study in the Evolution of Man, p. 255.
[3] *Ibid.*, p. 257. See also, J. G. Bourke, Scatalogical Rites.

and develop; the milk teeth are removed by the eruption of the permanent teeth; (b) pathological,—the gums become swollen, red, tender, sensitive, hot, painful; they have to be lanced; the child cries, secretes much spittle, grows thinner, loses appetite, refuses to eat, gnashes gums, has nausea, diarrhœa, fever, spasms, convulsions, rash, eruptions on the head, brain fever, cholera infantum and summer-complaint; (c) psychological,—the child becomes restless, fretty, cross, worrisome, peevish, sleepless, nervous, irritable, uneasy, incapable of being entertained. It is possible for the teething child to escape all of the conditions that are truly pathological, and certainly no one child ever has all of those enumerated above, some of which are connected with teething only in the popular mind.

The condition of the gums, together with the growth of the muscles of the jaw and the ripening of the instinct to bite and chew, cause the child to want to bite hard and cool things. It may be that the sensitive, swollen condition of the gums finds its natural justification as a means of developing the biting and chewing instinct. The folk have a strong conviction that the teething child should have something hard to chew. The following things are mentioned in the returns as those known to have been given to teething children: rubber, bone and celluloid rings; rubber and tin rattles; rubber and china dolls; pieces of steel, iron, wood; silver dollar and other coins; silver knives, forks, spoons, napkin rings; clothes-pins, tops and other wooden toys; watch, pocket knife, keys. Mothers were reported to have pressed and rubbed the gums with their fingers, gold rings, metal thimbles, coins and other hard objects.

With the advent of teething the sucking instinct begins to fade and the biting and chewing instinct begins to develop. While this transition is being made, soft objects tend to stimulate the sucking movement while hard things set off the biting reflex, the natural wisdom of which is apparent, otherwise the mother's nipple might be injured and the child's supply of natural food cut off prematurely, or hard things remain unprepared for digestion.

The facts concerning teething, enumerated above, reflect the lay mind in regard to this phase of child life and in many regards is very much at variance with the opinion of the professional mind. The consensus of opinion of the medical world is that teething should be attended by none but normal and easy conditions. The spasms, fever, rashes, gastro-intestinal disturbances are due to nervous reactions caused in many instances by ignorant parents tampering with the child, pressing the gums down upon the cusps of the teeth weeks before they are ready to erupt. Occasionally the gum may be unusually thick and hard and need the attention of the physician with the lance.

But this is an abnormal case and the exception. Many of the disturbances that come from other causes are ascribed by the lay mind to teething on account of their concurrence with it.

The temporary teeth are twenty in number, ten below and ten above; five for each jaw to the right and five for each jaw to the left of the median line. There are four upper and four lower incisors, four canines, four first molars and four second molars. In order of appearance they come in groups in the following sequence: first, the two central lower incisors which appear in the fifth to the eighth month, though not infrequently these erupt as early as the twelfth to the sixteenth week. After the appearance of this group there is an interval of two or three weeks, followed by the appearance of the second group, namely, the four upper incisors which appear in the seventh or eighth month to the tenth or eleventh month. Then follows another rest of from one to three months. The third group is made up of the two lateral incisors, two upper front molars, two lower front molars, erupting in this order during the fourteenth month. This group is followed by a long period of rest lasting about four months. The four canines form the fourth group and appear in the eighteenth to the twentieth month. The fifth and last group consists in the four second molars which appear as a rule after the child is two years old. The appearance of the temporary teeth in these groups, according to the order and time indicated above, necessitates a gradual change from liquid to solid food and gives the digestive apparatus time to make its adjustments both by growth of structures and development of functions.

The teeth of southern born children appear earlier and develop more rapidly than those of northern born children. It is the testimony of dentists that children who are slow in erupting their teeth are slower in losing them unless delayed dentition is caused by rachitis or other constitutional dyscrasia.

The permanent teeth erupt in the following order: the first molars (which are present in embryonic form at birth) erupt at six years of age, the central incisors at seven, the front bicuspids at nine, the posterior bicuspids at ten, the canines at eleven to twelve, the second molars at twelve to thirteen, the wisdom teeth at seventeen to twenty-four or twenty-five.

More teeth occupy the jaw at six or six and a half years of age than at any other time in life, there being present a full temporary set of twenty, all in full eruption, and the whole permanent set, excepting the wisdom teeth, ready to erupt, making a total of forty-eight teeth in the jaws at one time. It is at this age that the lower features of the child undergo material change. The whole face increases in size, the lower jaw develops forward and downward in order to accommodate

the increase in the number of teeth from twenty, the temporary set, to thirty-two, the permanent set. This is attended by growth in size and increase in strength of the jaw muscles and, as will be seen below, correlates with the irresistible impulse to chew, nibble and munch things.

Chew, Munch, Nibble. The child begins its foraging in-doors as soon as it acquires the ability to creep; this is enormously extended with the acquisition of walking. Beginning at about the middle of the second year when the first and second molars are appearing and the jaw bone and muscles are passing through a period of accelerated growth and the compound grinding motion of the jaw is acquired, the child begins to chew things, apparently for the sake of chewing them. At the same time he is very much enlarging his repertory of things to eat. This tendency to chew, nibble and munch, gains considerable momentum in the third and fourth years, and reaches its climax between eight and thirteen, during which time the lateral incisors, the front bicuspids, the posterior bicuspids, the canines and second molars are making their appearance and with which phenomena the tendency is phyletically related. Man was frugivorous, herbivorous, then carnivorous before he became omnivorous.[1] In the kind of teeth and the order of their appearance in the child he repeats this racial experience. In the furgivorous, herbivorous and early carnivorous periods of development, primitive man had to do a great deal more chewing than he has to do now with his mixed diet, his concentrated foods, and cooking and other means of predigesting food. In chewing, nibbling and munching is found the ontogenetic expression of these early racial habits. Other expressions of these racial foodmarks are seen in the preference at this age for fruits and raw vegetables.

The following list of things which children have been observed to carry around in their pockets to satisfy this impulse is taken from the one hundred sets of reports previously referred to, given in the order of frequency mentioned: licorice, cinnamon, birch, sassafras, calamus, cloves, slippery-elm, wheat, corn, coffee-grains, candy, chewing-gum, winter-green, honey-suckles, shoemaker's-wax, leaves, grape-tendrils, bees-wax, rose-leaves, orris-root, grass, bark, fruit-tree-wax, sorrel, sticks, clover, petals, rye, rubber, peppermint, seeds, black tar, tooth-picks, paper, oats, sweet-sicily, alum, crackers, nutmeg, fennel, wood, dried fruit, spicewood, wax (doll's head), pennyroyal, raw turnips, parched corn, ends of pencil and pen, orange and lemon skins, grains, peach pits, tobacco, chocolate, Indian-tobacco, buckwheat, dried-beef, brook-mint, babywood, raisins, cord, rags, hair, ham-rinds, nuts, sugar, camphor, gum, thread, caraway-seeds, cap-strings, corn-stalk, cedar-balls, handkerchief, straw, briar-leaves, ends of matches, young shoots of trees, candle ends, hard bread, fruit of mallow, acorns, onions, apple-skins, lead-pencils, buttons, raw sweet-

[1] Chamberlain: The Child, A Study in the Evolution of Man, p. 255.

potatoes, oatmeal, spices, roots, bones, starch, butternuts, walnuts, honey-in-the-comb, hoarhound, rubber, on-pencils, magnolia-bark, bird-seed, end of necktie, lace on apron, dress, green apples, sticky fly-paper, hazel-nuts, cocoa, coal, raw potatoes, barley, prune-pits, plum-seeds, corn-silks, huckleberry-buds, sweet-smelling-shrub, buttons from button-bush, catnip, mint, feverwort, bread and butter, sugar-cane, potato-peeling, cheese, green oak-balls, cardboard, glass, may-apples, peppermint-drops, cotton, soap, tea-leaves, wheat-flake, tansy, beans, macaroni, herbs, popcorn, dried peas, elm-buds, ginseng, Turkish rhubarb root, keys, strap, slate-pencil, lilac-sprig, lilac-buds, spruce gum, cold cooked meat, cinnamon wafers, peanuts, salt and tea leaves, tamarac, catberry leaves, poppy-seed, ginger-cookies, flowers, water-cress, chalk, magnesia.

Boys chew many such things as coffee and licorice to make their spittle look like tobacco in imitation of men who chew tobacco. During the time that this impulse of chewing is at its height there seems to be a pleasure in the mere exercise of the salivary glands. Use is made of the excessive secretion in many instances among boys, in developing expertness in spitting through the teeth. Some of the things enumerated above are nibbled at not so much to satisfy the impulse to chew, as to give additional experience to the sense of taste. Alum is used for its taste and "to pucker our faces,"—a taste-motor and social complex which several report as having enjoyed. About one-fourth of the list contributes toward the satisfaction of hunger, in addition to furnishing something to chew.

Taste. Kussmaul's experiments upon more than twenty newly-born children in which he used cane-sugar, quinine, common salt and tartaric acid, prove that the child has sensibility to taste at birth. His observations were repeated by Genzmer, Preyer and others, who agree substantially with him in his conclusions. He found that the salt, the quinine and the acid produced grimaces as an expression of dislike, but with much individual variation in the manifestations in the different cases. The sugar, on the other hand, produced movements of sucking. It will not do, however, to interpret these early grimaces as evidences of dislike, nor the sucking movements as indicating preferences. Kussmaul observed the child in some cases responding to the taste of sugar with the mimetic expression for bitter. "Some made a wry face at the first introduction of the solution of sugar, while they took in the rest of it with satisfaction. It was not the sense of taste itself apparently that was at fault, but another psychical experience,—the surprise caused by the sudden effect upon the sensitive nerves. One of the children even started directly with fright, when it came so suddenly to taste the unfamiliar liquid (which was warmed). Children that had reacted strongly upon quinine, commonly made a grimace again, or several times in succession when a solution of sugar was introduced, but with de-

creasing animation, until finally a comfortable sucking and swallowing were submitted. This accords with the experiences which every adult has in his own case, viz., that a very bitter or nauseous taste does not allow itself to be at once supplanted by a sweet one, but at every fresh stimulus of the gustatory sense by substances of different savors, it recurs with decreasing force." Genzmer, who repeated Kussmaul's experiments upon twenty-five infants, most of whom he observed immediately after birth and from three to six days after, some up to the sixth week, found that some newly-born children responded to an attenuated solution of quinine (one-quarter to one per cent.) and one of vinegar, by sucking movements, just as they did to a solution of sugar. However, if the solution was more concentrated, the reactions were such as to indicate the disagreeable nature of the sensation. Preyer[1] believes that the inability of the infant to appreciate the weak solution of quinine or acid is due to its inability to press the tongue against the hard palate and thus facilitate the end organs of taste in their exposure to the substance to be tasted, whereas the presence of the liquid upon the tongue was enough to set off the sucking reflex. There can be no doubt about the fact that in the newly-born infant the sense of taste is capable of making discriminations both in regard to quality and intensity. These discriminations are yet unrefined and relatively vague, but lead all of the other senses in appreciation at birth. Preyer goes so far as to say that "Children born about two months or more too early are no less sensitive to the gustatory stimuli spoken of than are those that are born at the right time.[2] Sigismund[3] was the first to point out that the sense of taste is the first of all the senses to yield clear perceptions, to which memory directly attaches itself. This has since been confirmed by Preyer, Dr. Hall,[4] Miss Shinn[5] and others. Not only is taste the first sense to develop but it is the only one to continue to develop throughout life and grow in refinement with old age. Sweet is the first taste to be preferred and leads in popularity throughout childhood. This is not alone because the mother's milk and all artificial foods substituted are sweet. Natural selection had marked sweet as its favorite in the animal species as well as in man. The foods of land animals in general is characterized more by sweet than by any other taste, while most poisons are either acid or bitter. The empirical

[1] Preyer: The Senses and The Will.
[2] Preyer: The Senses and The Will, p. 122.
[3] Sigismund: Das Kind und Welt.
[4] G. Stanley Hall: Notes on the Study of Infants, *Pedagogical Seminary*, Vol. I, p. 129.
[5] Shinn: Notes on the Development of a Child, p. 213.

dietaries of all but polar people show a preponderance of sweets. In the ideal dietary prepared by expert dietetists, and quoted by such authorities as Hutchinson, Thompson, Richards, carbohydrates constitute four times as much as proteids, in weight, and five time as much as the fats.

While it is true that taste is the first sense that offers anything like clear discriminations, and forms the basis of the first associations, it does not keep the lead long. It is soon passed by sight which, from the beginning of the second month on to the fifth month, furnished the infant the sensations that are most consuming in interest. In the fifth month hearing gains very much in importance and ranks higher than sight, and this in turn is succeeded by the interest in touch and the muscle sense in the sixth month, at which time skill in grasping and otherwise handling objects is very rapidly developed. This handling of objects under the guidance of sight forms the chief and consuming interest of the child during the last half of the first year. In this order of development we seem to have an instance in which ontogeny does not follow the order of phylogeny. Although taste is phyletically much older than sight or hearing, its development in the individual attains no conspicuous degree until in the second year, after sight and hearing have reached a considerable degree of importance. It seems to me, however, that the inversion is only apparent and not real. In the prenatal development of taste, and its further development during the first weeks of life after birth, is found the representation of this early phyletic lead of taste over the other senses mentioned. In the lower species in which the selection of food is considerably dependent upon taste, the instinct is narrow and relatively rigid. In the higher stages, where the selection of food is aided by sight and hearing, the rigidity of the instinct is broken up, and taste is lifted to a higher plane upon which the number and variety of distinctions are greatly enlarged. The increased value of taste in the second year is representative of this later phyletic stage.

Teasing to Taste. Beginning at about seven years in the child's life, taste becomes mentalized as it has never been before and acquires a new and almost independent value. This is at a time when the nervous system has acquired ninety per cent. of its bulk, and its changes become more and more those of development in function rather than those of growth in structure. The senses all become more acute and the acquisitive ability of the child is enormously increased. A new cycle, both in physical and mental development, starts to run its course. The child passes a station that once in the prehistoric past may have been the terminus of his development. The new importance of taste is shown by the universal tendency in childr

this age to want to taste everything that is to be eaten or drunk and many things that are not. They haunt the kitchen, the pantry and the medicine cabinet. Their curiosity in the nature of the different foods and the different methods of preparing them is increased to a remarkable degree and taste becomes more than ever before a special organ of apperception. This interest's curve extends between the years of seven and ten, and aside from its ontogenetic significance, suggests man's past experience in increasing his list of foods and his invention of new ways of preparing them after the discovery of fire.

The following is a list of things which children tease to taste, given in the order of their frequency mentioned in the returns: bread dough, cake dough, medicines (camphor, soothing-syrup, koumiss, dried herbs), spices (cinnamon, cloves, allspice, pepper, nutmeg, curry, new peppers, ginger), vinegar, soda, chalk, fruit or vegetables being canned, hot things cooking, uncooked sauces, dressings, raw pie crust, filling for pies, chocolate, starch, mustard, salt, vanilla, mixtures to be cooked, vegetables or fruit at time the can is opened, jellies, lemon, tea, coffee, icing, rich cake, raw potatoes, perfume, raw meat, lard, alum, flour, yeast, sugar, mince-meat, raisins, tea-leaves, salads, boiled beets, butter, meat, cider, cabbage stalks, raw cabbage leaf, krout, horse-radish, bluing, soap, tobacco, buckwheat batter, hard sauce, uncooked pudding, filling for deviled crabs, cocoa, lemons, eggs, tarts, dried fruits, borax, cocoanut, "food for sick," molasses, peaches, pears, pie just out of the oven, pudding just out of the oven, ice-cream, in its stages of making, rhubarb, berries, white of egg, yolk of egg, custard, butter just from the churn or just purchased, rice, coffee grounds, citron, crusts of bread, preserves, cream, currants, dried-beef, radishes, onions, gooseberries, raw vegetables, sliced apples, sliced turnips, sliced sweet potatoes, wine, champagne, oil, any colored fluid, beeswax, lime, tar, slippery-elm, "all new things," nasturtiums, brandy, dirt, soda-water, baby-powder, ink, lye, mud-pies.

Mixtures. Along with the dominance of the impulse to taste things, comes the interest in making all sorts of mixtures in foods and drinks and the desire of the child to have its own portion of raw material of food which it shall prepare and cook. In the early part of its course, the impulse is about equally strong in both sexes, but in the latter part, it is much stronger in the girls. The phylogenetic parallelism suggested by this is that of the age when man began to adopt a more elaborate mixed diet in the preparation, of which cooking played a much more important rôle than before, and when the duty of the preparation and the cooking devolved upon women.

The following are samples of food mixtures reported to have been made by children between six and twelve: cake and vinegar, fried potatoes and butter and vinegar, preserves and vinegar, oatmeal and vinegar, bread and salt and pepper and mustard and vinegar, pound cake and pickles, potatoes and vinegar, pepper and salt and starch and vinegar, corn bread and vinegar, two teaspoons vinegar and one of salt and one-half of pepper (playing medicine), bread and buttermilk, bread and sugar and vinegar, corn and vinegar, cheese and pepper and vinegar, mustard and eggs and vinegar, bread and vinegar, fried eggs and vinegar, mashed potatoes and molasses, mashed potatoes and mustard, pota-

toes and mint sauce, peaches and salt and pepper, tea and cheese, pork and sugar, potatoes and sugar, cabbage and sugar, boiled cabbage and molasses, cheese and preserved peaches, bread and catsup, cheese and hash, cabbage and onions and turnips and water, dough and olive oil and currants and cloves and other things (all baked) *ate it*, mashed potatoes and catsup, pie and beef gravy, strawberries and tea, gravy and potatoes and molasses, bread and gravy and molasses, hash and molasses, potatoes and catsup and syrup, beans and sugar, tomatoes and potatoes, syrup and lettuce, cheese and molasses or sugar, potatoes and cake, fish and molasses, bread and butter and salt and pepper, apples or bananas and salt, potatoes and eggs and catsup, dried beef and molasses and bread (did n't like it), bread dough and cake dough, peaches and salt, cold slaw and preserves, fish and molasses, ice-cream and tea, bread with butter on one side and preserves on other, apple sauce and boiled rice, strawberries and milk and sugar and salt and pepper and water and cake crumbs and vinegar, molasses and gravy, vegetables and meat and potatoes and everything mixed on plate, bread and butter and pepper, molasses and cake and milk, green gooseberries stewed and cottage cheese, ham and syrup, grated crackers and grated peppermint candy and sugar and ice-water, bread and butter and lard and molasses and pepper and salt, lettuce and molasses, bread and butter and onions and radishes and pickles, pie and salt, cheese and salt, honey and sugar, meat and molasses, molasses on everything, milk on potatoes, fish or meat, molasses and cut cabbage, bread and salt, bread and sour milk and sugar, crackers and water, molasses and cottage cheese, syrup and fried pork, salt and pepper and rice pudding, onions and oysters bread and butter and ice-cream, eggs and onions, pepper and butter, sliced oranges with chicken, beans and catsup, potatoes and catsup, cabbage and potatoes, molasses and apple sauce, jelly and potatoes, jelly and pineapple, parched corn ground and molasses, apple sauce and rice pudding and potatoes, skinned grapes cooked in sugar and grape skins cooked in sugar, molasses and egg, syrup and peas or corn, syrup and tomatoes, syrup and meat and bread, potatoes and milk and water and peaches, meat and milk, preserves and meat and potatoes, molasses and oatmeal, tomatoes and preserves, eggs and potatoes and catsup, sour juicy apples and molasses, fragments of *all* dishes mixed together, sweet potatoes and milk, milk and preserves, potatoes and milk, lettuce and syrup and vinegar and sugar, molasses and sugar, eggs and vinegar, asparagus and milk and sugar, coffee and syrup, fried bacon and syrup, soup and bread crumbs and mashed potatoes and pepper and salt, potatoes and jelly, cottage cheese and sugar, gravy and molasses, eggs and vinegar and sugar and pepper and salt, cherries and sugar and milk, butter and milk, half cold boiled potatoes mashed and molasses, deviled ham on under side cocoanut cake, pickles and sugar, fried meat grease and gravy, tomatoes and corn and mashed potatoes, bread and butter and vinegar and salt and pepper, tomatoes and gravy, fried meat and molasses.

Additional light is thrown upon the rise of taste to a new and greater value from about the age of seven, by no less interesting a list of drink mixtures. The intense interest shown by children between six and thirteen in mixing all sorts of concoctions to drink, their experimentation with every kind of new taste sensation furnished by liquids and the solutions of solids in liquids, is very general and extends over about the same period that the interest in food-mixtures does. It is also more prevalent among girls than among boys.

It is interesting to compare the following list found in the reports, with the list of food-mixtures: wintergreen leaves and hot water, jellies and water, pennyroyal tea and sugar, molasses and tea, milk and root beer, molasses and milk, lemonade and bright fruit juice, salt and pepper and milk, coffee and butter, cut-up root and water, sassafras tea and sugar, cherry juice and water and sugar, warm water and milk and sugar, condensed milk and water and sugar, sour milk and sugar, vinegar and milk, licorice water, lemon candy and water, water and milk and salt and sugar and fruit juice (made sick), ripe currants and water and sugar, buttermilk and catsup and pepper and salt, egg one-third boiled and cold water, "Toddy"=vinegar and water and sugar and soda—also called Vinegar Bitters,—"Ginger Beer"=water and molasses and vinegar and ginger and ice, broken peppermint leaves and water and sugar, one-fourth glass vinegar and cold water and salt and pepper, water and vinegar and molasses and pepper and salt and cloves and allspice and mashed fennel seed and grated nutmeg and castor oil and peppermint and cayenne pepper and sugar (this was prepared by a little girl for a servant girl, who drank it, "liked it," but said she wanted "no more to-day"), vinegar, soft drinks, ginger and molasses, grape juice, cider, coffee, peppermint tea, raspberry leaves tea, lilac leaves tea, root beer, cocoa, chocolate, soda water, cherries and water, scraped apples and water, red candies and water, licorice drops and water, slippery elm water, chestnut leaves and water, maple sap, vinegar and sugar and salt and pepper, mashed canned berries and cider—allowed to sour,— sage tea, box birch tea, boil rose leaves—make different colors,— molasses and water and vinegar, catsup tea and sugar, pepper and hot water, licorice root and candy and water, juice of crushed wild cherries and sugar and water, pods of shepherd's purse in water, mullein tea, life everlasting tea, clover tea, tea and lemon juice and sugar and ginger and soda, weak coffee and soda, peppermint and mountain mint and birch bark and water (boil all and let stand until cool), vinegar and lemon juice and molasses and salt and pepper and cloves and other spices, water and salt and pepper, orangeade—orange juice and water and sugar, cinnamon bark and water, mint and water, tea from horse mint (drank but did n't like it), tansy tea, ginger, sarsaparilla, ice cream soda (because sweet).

The craving for a greater variety and intensity of taste experiences is further shown in the prevalence of smoking such things as corn-silks, grape-vines, mullein leaves, etc., among children of both sexes. The curve of this interest begins to rise at about the age of three in both sexes. It is at its highest between seven and ten in girls, and eight and twelve in boys. While it is common to both sexes, the boys indulge in the practice more than the girls do. The taste pleasure is not the only one derived from this indulgence. The sight and odor of the smoke, the pleasure-pain of the tingling tongue, the charm of imitation all add to its significance.

The following list of seventy-one things were reported to have been smoked by children. They are given in the order of frequency with which they were mentioned: corn silk, grape vines, mullein, rattan, chestnut leaves, paper, leaves, dock seed, tobacco, dock leaves, sticks, cigarettes, tea leaves, life-everlasting, corn stalk, cinnamon, grape leaves, cubebs, corn husks, coffee beans, smoke bean, cat tails, punk, pipe of Indian tree, grass, sawdust, oak leaves, dried berries, moss, wintergreen leaves, rags, cigars, golden rod, whalebone, oak roots,

cabbage leaves, broom splints, cherry leaves, dress goods, lilac leaves, calla lily leaves, straw, willow bark, willow leaves, licorice root, grape seeds, sweet fern leaves, cigar stubs, mullein seeds, milkweed, flowers, bamboo, birch bark, catnip, lamplighters, onion tops, corn cob, powdered bark, rose leaves, vanilla bean, pine tar, blackberry leaves, rope, hoarhound stalk, pine needles, clover tops, lichens, reeds, driftwood, chestnut blossoms, elm roots.

Medicines. With the growing consciousness of self and increased knowledge about the body, its structure and function, and the relation between the body and how one feels, there is developed a remarkable interest in medicine. The curiosity to taste medicines has been mentioned above. On the other hand there is developed a deep and abiding faith in their efficacy to ward off and to cure disease. Very keen interest is manifested in the traditional value of certain roots, herbs and blossoms. This interest is altogether greater than that shown for the solutions, powders and pills of the physicians. Possessed of the knowledge of the preventive and curative effects of certain plants children are prone to tamper with them and take the things that are "good for you" or will "cure you of the fever," whether there is any ailment or not. Not many steps intervene between this attitude and that of the hypochondriac with his acute mentalization of conditions and states of the body that should lie below the threshold of consciousness.

The following is a summary of plants, with curative values as given, known for their medical value by children under thirteen years of age, onions (for poultices, to eat for a cold, and for diphtheria), pennyroyal, tansy (for worms, and for painful menstruation), burdock (for rheumatism, and for the blood), wild-cherry (for colds), wild-cherry bark (for ague, and for a tonic), witch hazel (for bruises, hemorrhages, etc.), white oak bark, snake-root, elderberry, boneset (malaria, and general debility), feverwort, balsam (colds), catnip (colic), sweet fern (tonic, fever), Indian turnip, peppermint (colic), yarrow (for the liver), sage tea (for babies, and to keep the hair from falling out), hops (for general debility, insomnia, and when fried in fat good for colds in the chest and for rheumatism), mustard (for "plaster"), horse-radish leaves (poultice for headache), mullein tea (for colds, and for ague), sassafras (the tea for malaria, and the pith from the wood for sore eyes), flax-seed (for physic and for sore eyes), rhubarb (for physic), smart-wood (rheumatism), night-shade (for poison, used as a poultice), blackberry-root and leaves (bitters), dandelion tea (for sick headache, and for the liver), mulberry leaves (for headache), leaves worn in hat (to prevent sunstroke and for headache), calamus root, skunk cabbage (fried in fat, for sores), hoarhound (for rheumatism, colds, and fried in fat and used as a poultice for toothache), milkweed (take away warts, and boiled, is an antidote for poison), mint, wintergreen, life-everlasting, houseleek (for earache), mountain-mint, balsam apple, allspice, plantain (for bruises, and for headache), live-for-ever, daisy, celery leaves (for rheumatism), St. John's wort, arnica flowers and leaves (for bruises), camomile (tea as a tonic), saffron (scarlet fever, measles, etc.), wormwood (worms, indigestion), barberry (malaria, cholera), cinchona (chills and fever), mayapple or mandrake (liver and kidneys), buckeyes (carry in pocket for rheumatism), feverfew (colds), senna (laxative), pepper tea (sore throat),

rue (babies), four-o'clock (antidote for poison), spikenard root (tonic), celery (blood and nerves), spice (measles), dewberry roots (tea, for dysentery), sarsaparilla (chills, and a tonic), dogwood bark (chills), poplar and hickory bark (tonic), century plant (fever), ergot (hemorrhage), slippery elm (laxative, and as a poultice for inflammation), Turkish rhubarb (laxative), pokeberries (rheumatism), orris, bloodroot, pipsisewa (used by the North American Indians), elecampane (heart trouble), turnip leaves (poultice), eel-worm (salve), mallow (for everything), Indian-arrow root (malaria), sweet-cicily, glass-wood, pilot-weed, licorice, chickweed, alder bark (stewed in butter and used as an ointment for sores), box birch (tea used to prevent the hair from falling out), horsemint, five-finger-ivy, baby-wood and sassafras tea (used to purify the blood).

The second supplementary syllabus was as follows:

1. Write a list of the foods that you like best to eat and tell why you like each.
2. Write a list of the foods that you don't like to eat and tell why you don't like each.
3. Write a list of the things which you like best to drink and tell why you like each.
4. Write a list of the things which you don't like to drink and tell why you don't like each.

This syllabus was circulated chiefly among the children in the public schools of the city of Holyoke, Massachusetts. In all there were 1,475 sets of answers sent to me that were usable. They extended over all of the grades from the second, in the elementary schools, through the high school. In addition to these sets of answers were 56 sets sent from the students in the Normal Training School of Washington, D. C. The sets from the public schools were very well distributed between the sexes, and almost an equal number from each grade. This, of course, was planned in order that the comparisons between the sexes and between classes of pupils of different ages might be the more trustworthy. 1,025 sets of these answers were classified upon the basis of the age of the pupils. 450 sets were classified upon the basis of the grade to which the pupil belonged. This latter classification was made in order to see the effect of the stage of development upon the election of foods and drinks, and upon taste discriminations, as well as upon language ability.

On the basis of the kinds of food preferred, the returns indicate that there are at least five different stages in the development of taste and appetite, after the child is of school age: the first, characterized by the predominance of fruits and sweets; the second, in which fruits and raw vegetables lead; the third, in which meat, bread and potatoes are the characteristic foods; the fourth, in which sweets, acids and *cooked vegetables* are added to these; and the fifth, in which there is a constriction in the variety of foods, many of the tastes of the former periods having faded away and the individual settling upon the more or less permanent likes of maturity. The time limit of each stage will appear in the following exposition.

The predilection for sweets and fruits shows itself as soon as the child begins to eat solids, and continues with the milk diet in its modified forms, until about the age of ten. The fruits which were indicated as preferences in the returns are oranges,

bananas, apples, peaches, pears, berries and grapes. Cake, pie, ice cream, doughnuts, cookies, cream puffs, candy and jams were the favorite sweets. The boys lead in the fruits, and the girls in the sweets. Ranking considerably behind the above named preferences, but of sufficient importance to be mentioned are potatoes, beans and corn among the vegetables, and chicken, turkey and eggs among the meats. The foods that are most generally disliked are the acid fruits, such as crab-apples, gooseberries, lemons, etc.; among the vegetables disliked are potatoes, onions, cabbage, parsnips, turnips, pickles and rhubarb; pork, pig's feet, sausage, liver, fish and oysters are the most generally disliked among the meats, the dislike for the last named two coming very conspicuously to the front in the ninth and tenth year, and later, becoming favorites. Pickles and onions become most disreputable in the tenth and eleventh years, leading everything else among the foods disliked. Cereals to which both sexes seemed indifferent up to the ninth year, fall into general disfavor from nine up to the age of adolescence. The drinks preferred by the children of this stage of development are water, milk, soda-water, cocoa, lemonade, in the order mentioned. Coffee and tea begin to gain favor at ten and eleven. These drinks are perhaps prohibited by most parents prior to that age. In the list of drinks that are disliked the intoxicants lead. This is due to social suggestion, as a great percentage of those testifying against these drinks confess that they never have tasted them. Next to the intoxicants in disfavor are tea, coffee and lemonade. The testimonies against tea and coffee are also colored by the suggestions of parents, since these same drinks become favorites among the children who are allowed to drink them.

Although the language expression ability is always necessarily behind the sense discrimination and is never quite adequate to it, the former is relatively a safe index to the latter and valuable light is thrown upon the progress in the development of taste and appetite by the reasons given for the likes and dislikes of foods and drinks. The reasons which are given by the children in the lowest grades are very vague and indefinite; "because it is good," "nice," "sweet," "sour," "I like it," "it is good for me," "when you eat it you don't feel hungry," "healthy," (healthful), "strong," "has peas in it (pea soup)," "has milk in it" (oyster soup), etc., are characteristic expressions used. The hunger of children of this age is massive, intensely keen and imperative but as yet relatively undifferentiated and unmentalized. The hungry child's mental emphasis is placed upon the *food* which he wants and not so much upon his appetite. His mind, stimulated, it is true, by hunger, looks *out*, not *in*. It is simply this or that article of food in relation to his hunger

that is of concern to him. The first step in the mentalization of his taste and appetite aside from the general awareness that he is hungry and the reference of this feeling to some of the foods with which he has had experience, is taken when he begins to analyze his food into its qualities and to individualize certain flavors; also when he analyzes certain food compounds into their elements. For example, a fruit is preferred "on account of its juiciness." Here a certain quality is abstracted from its setting and associated with a certain taste or appetitive pleasure. Again, cake is preferred on account of its frosting or on account of the raisins in it; lemonade is relished on account of the peculiar effect of the lemon and the sugar both of which are mentalized. The act of analysis in each of these cases looks both outward to the food and inward to the effect upon taste and appetite, and the association between the food and its effects, beginning in vagueness, gradually gains through repetition, the clearness that lifts the taste-appetite experience into a heightened value in consciousness. By the age of eight the other senses most intimately correlated with taste have become individualized in relation to food. The contact sense, the temperature sense, the muscular sense, smell and sight all enter as important factors into the consciousness of the food complex. Before the age of eight these same senses have been scarcely less important in their bearing upon the enjoyment of food but they have remained submerged in the massive and keen animal appetite, not gaining separate recognition in consciousness to any mentionable degree. The reasons given by the eight-year-olds indicate that at that age some foods are liked because they are "hard," "soft," "hot," "cold," "mealy," "hard to chew," "look nice," "smell good," etc. Another kind of reason, more remote than the mere satisfaction of taste or hunger, is that of the effect upon the body, *e. g.*, such expressions as "it makes me strong," "it makes me fat," "it makes me grow," "good for my health," occur not infrequently. These expressions, however, seem to have been caught from parents who have used them to induce children to eat foods which were refused or disliked, and are repeated by the children without much appreciation of their meaning. At the age of adolescence this kind of reason rises to such importance as to push every other aside, as will be seen in the discussion of the tendency among adolescents to force their appetite to gain certain bodily results.

The reasons for dislikes are more definite and clear cut than the reasons for likes. The unpleasant experience with a food, the disagreeable taste, etc., seem to make a more definite impression upon the child than the pleasant and agreeable. This

is for the sake of his defense. The biological purpose of his preferences is to govern food selections; that of his aversions to govern food rejections. In giving reasons for both likes and dislikes the girls are more definite than the boys of the same age They also have a greater number of likes and dislikes than the boys of the same age. These two observations hold true throughout all of the stages of development. Boys show a greater dislike than girls to sour, while the girls object more than the boys to bitter.

The strong preference for fruits holds over until the age of thirteen or fourteen, although it grows relatively weaker from ten to thirteen. While this preference is weakening, that for raw vegetables, such as turnips, potatoes, cabbage, raw peas, onions, tomatoes, and artichokes is becoming very marked in the children of both sexes. These same articles cooked, are strongly disliked at this period. It is interesting to note that this fruit-and-raw-vegetable stage rounds out the pre-adolescent stage of development, at the end of which the youth is so well adjusted to his environment, that, in a tropical climate he can lead a life independent of his elders. This fact seems to point toward the support of the theory that the close of the pre-adolesceut period once marked a terminus in racial development. This second stage extending from about ten years of age to thirteen is characterized by (1) somewhat of a decrease in the preference for fruits, (2) *a marked liking for raw vegetables*, (3) a rise in the demand for meats, potatoes and bread, this latter being the transition preference to the dietary of adolescence. The child craze for candies, cookies, jellies and other sweets declines from the tenth year. It has a revival along with a return craze for acids in mid-adolesence—especially among girls. During this second stage the importance of fruits is about the same as that of meats, the girls preferring more of the former, the boys more of the latter. Eggs and sea food are among the meats that are conspicuous in the list of likes at the end of this period. This is strikingly suggestive of racial recapitulation as these two foods were the ones that followed the tearing away by the race from the main dependence upon fruits and raw vegetables during and after the arboreal age.

The reasons given by the children between ten and thirteen for their likes and dislikes in foods and drinks are much more elaborate, are clearer in their discriminations, are of a greater variety in scope, and indicate much more minute analysis of both foods and sensations. Most of the qualifying terms given by children under ten years of age consisted of single words that implied little if any more than the abstraction of a single quality in the food and its reference to a single aspect of the

sensation—either special or general. Foods were described as nice, sweet, sour, salty, bitter, juicy, tender, tough, cold, hot, soft, hard, mellow, tart, crisp, fresh, light (bread), hot (onions), mealy (potatoes). Two or more qualifying terms were seldom used in connection with the same food. Among the testimonies of the nine and ten-year-old children there occurred a few such expressions as: red and sweet, soft and mellow, sweet and juicy, sweet and cold, etc., showing some increase in the analysis of both the food and the sensation, and a corresponding complexity of the association between the two. A few analyses of compounds into elements were implied by such expressions as: has raisins in it (pudding), full of good things (fruit cake), have cream in them (cream puffs), has frosting on it, has milk in it (oyster stew), has sweet oil on it (salmon), etc. In such analyses the attention is nearly always monopolized by some one element. A few interesting comparisons were found: *e. g.*, has a milky taste, has a fishy taste, has a cheesy taste, etc. These latter exceptional things in the first stage become common in the second. The simple descriptive terms occur less frequently and compound terms abound. The analyses of food compounds is more nearly exhaustive and the attention more uniformly distributed over the different elements. The different flavors become individualized. *Self* consciousness expands enormously through the mentalization and individualization of *taste* and appetite almost into the importance of separate personalities. The child now speaks of "my appetite," "my taste." The returns are full of such expressions as, "it does n't suit my taste," "it does n't please my taste," "it does n't agree with my taste," "my appetite craves," "it satisfies my appetite," "I can't control my appetite," etc. Self consciousness in relation to food is also extended through the lifting into consciousness different parts of the body as being affected by food. The food that is taken affects the stomach, the liver, the bones, the blood, muscles and nerves. The health psychoses come much to the front. This is due in part to the introduction of the study of physiology at the time when the child is between ten and thirteen. This helps, also, to account for making the liver, stomach, bones, blood, etc., a part of the food psychoses of this stage of development. But it is mainly due to a new evaluation of the self in general and of the body in particular. The predolescent boy and girl are very much interested in the bodily abilities and adjustments that are relatively so complete at this age. The following are typical expressions taken from their testimonies in regard to foods which they prefer: "good for my health," "wholesome," "strengthening," "makes me strong," "makes me fat," "makes me grow," "makes flesh," "gives me blood," "makes muscle,"

"makes bone," "makes nerves," "makes brain," "helps me to live," "good for my stomach," "good for my liver," "purifies my blood," "yields energy," "makes me big," etc., "contains albumen and is healthy," "contains gluten," "contains protein and sulphur," "contains starch and is therefore healthful," "are very digestible," etc. The objections to certain foods are as much due to their relation to health as to their being unpalatable. The unpleasant sensations and the disagreeable effects of certain foods are as valuable as the agreeable ones in drawing the attention to a sharper focus and stimulating the mind to make discriminations that are clearer and more definite and hence of greater service. "Makes me sick," "gives me colic," "makes me nervous," "does not agree with me," "makes me vomit," "sticks to my teeth," "makes my teeth rot," "makes me have cankers," "gives me toothache," "injures my stomach," "dries up my blood," are illustrations of a valuable type of association between certain foods and their effect upon the body in general and upon certain parts of it. This is further developed in the discussion of aversions. The girls in this period begin to show an interest in the effect of foods upon their complexion.

Another advance of this stage over the other is seen in the much enlarged list of discriminative words that have branched off from the trunk lines of sweet, sour, salt, bitter, hot, cold, hard, soft, etc., and that sharply and clearly develop the more or less blurred sensations inadequately expressed by the terms used by the children of the first stage. To them are added such as: it burns, bites, smarts, stings, nips; is stiff, strong, slippery, rich, mushy, sticky, mealy, bony, seedy, fishy, doughy, crumbly, musty, watery, starchy, stringy, mousie (cheese), tasteless, flat, insipid, greasy, oily, peppery, sickening, nauseating, etc.

In this period the food consciousness is also extended to the source of the food and to the method of preparing it. Certain fruits are liked "because they come from the south where the vegetation is so luxuriant and the foliage so beautiful," or "because they look so beautiful on the trees." This plays a much more important rôle in the dislikes than it does in the likes; *e. g.*, "I don't like meat because it makes me think of swine lying in the mud, of their eating slop, etc.," "I don't like tea because it makes me think of the dirty Chinese," "don't like canned foods because I fear lead and tin poison," "don't like tomatoes because I visited a canning factory and saw how they were put up." The cross between the relish of the food and the food's effect is brought to mind, *e. g.*, I like pork but it don't agree with me.

The systemic feelings are brought up into consciousness to a

much greater degree than in the previous stage. "It fills me up," "makes me feel full," "makes me drowsy," "cooling on a hot day," "refreshing," etc., are types of expressions found frequently. The æsthetic appearance of the food and the beauty of table etiquette, although more or less despised by the boys, begin to affect the girls.

The reactions to drinks is very similar to that of foods so far as the increase in range, the sharpness and definiteness of discriminations and the growth in richness of associations are concerned. The same drinks liked in the previous period of development hold over in their popularity; and others, as coffee, tea, cocoa and soda water and lemonade gain in favor.

Some reactions to the teaching of scientific temperance in our schools were found that are edifying and certainly interesting to others as well as to those who are pushing the movement along. These expressions were given as reasons for disliking some of the intoxicants: "makes you sick," "is poison," "poisons you slowly," "kills you," "makes you insane," "eats out your stomach," "makes ulcers in your liver," "will eat you up and don't taste good," "deprives you of all of life's pleasures," "injures the health," "chokes you," "my teacher told me never to touch it," "I have signed the pledge," "I have signed the pledge twenty-seven times."

The third stage coincides in time with the first half of the period of adolescence. The changes in taste and appetite and consequent changes in the dietary are a part of the great changes in the entire symphony of life with its wonderfully enriched orchestration at that time. The rapid growth of the entire body is the expression of the acceleration in the process of nutrition. The whole sphere of life extends its circumference. The relatively stabelized digestional habits that were adequate to the pre-adolescent period are broken up and new ones formed to meet the demands of life upon a higher plane. The glands concerned with digestion increase in size and the profusion of their secretions. The alimentary canal increases in size, its walls thicken, its muscles become more powerful, its constrictions more marked, its secretions change the proportion of their elements, and their specific gravity, the tongue, the lips, the palate, the jaws, all change in size and shape, the muscles of the jaws increase in size and strength, and the second molars make their appearance. The machinery of digestion is all overhauled and enlarged to meet the heavier demands made upon it. It is not to be wondered at that during this readjustment there is great instability and fluctuation in the appetite. On the whole the amount of food is greatly increased. However, 29 per cent. of those who replied to the second syllabus testify that during the period of rapid growth they ate less

than before. This could be accounted for by the increased efficiency of the assimilation resulting in the actual digestion of a greater percentage of the food that is eaten. But, on the other hand, some lose their appetite almost entirely and while growing tall lose in weight. Seventy-one per cent. report to have had great fluctuation in their appetite at adolescence, the appetite at times being ravenous in its demands, incapable of being satisfied even by gorging; at other times it was absent for days. Thirty per cent. reported that they drank a great deal more than during the previous periods. Many didn't remember about themselves but had observed this fact to be true in others who were younger. The food and drink repertory vastly enlarges. The general change is from the fruit and raw vegetable diet over to a meat diet with bread and potatoes as the main accompaniments. It is a period further characterized by the development of very sharp likes and dislikes; by the overcoming of many old aversions and the forming of many more new ones. The general liking for meats becomes specialized and we find it breaking up into preferences for many particular kinds of meats, such as turkey, chicken and especially wild meats; the quail, the duck, the rabbit, the squirrel, and the pheasant being oftenest mentioned. The appetite, as a rule, is keener and much more massive in both sexes, and the distension of the viscera and the inertia caused by a full meal are for the first time mentalized into enjoyment. Voracity and gluttony are not uncommon. The variety of taste sensations, both agreeable and disagreeable, which is developed is very much increased. The relatively homogeneous tastes of childhood were broken up and individualized to a considerable extent in the pre-adolescent period. This process of the differentiation of taste sensations is carried immeasurably further in early adolescence. Extreme sensations are craved; delicacies are relished; the minute details of flavors, temperatures, degrees of hardness and softness, pain intensity, contrasts, etc., become embossed in consciousness. The whole range of the taste capacity is put to test. The sweet, the sour, the bitter, the salt, the acid, the acrid, the peppery, the tingling, the puckery, the soft, the hard, the crisp, the hot, the cold, the succession of hot and cold—as the hot chocolate with ice cream, etc., are all experimented with. They love to visit the soda fountain and sample every new drink. The testimony of a score of druggists indicates that adolescent girls exceed the boys in this particular. Perhaps the tampering by the boys is not limited to soft drinks. At hotels and cafés they are curious to try every new dish. The fruits, the meats, the vegetables, prepared in every new way are sampled. The matter of temperature becomes very important; hot drinks of various kinds

are acquired; cold drinks and ices receive new indulgence; contrasts in temperature,—a hot drink with ice cream, ice cream on hot pie, hot drink on a cold day, a cold drink on a hot day, satisfy the new born curiosity begotten of taste and appetite. Contrast in flavors, as in lemonade; contrast of the effects of the different ingredients in salads; the effects of sauces and seasonings; the sharp, stinging foods, as horse radish and mustard; the Worcestershire, Tabasco and Chili sauces; peppers, mangoes, pickles, pearl onions, kohlrabi, cauliflower, spiced foods, catsups, caviar, anchovies, etc.; the sweets are gingered, sodaed, tarted, limed; single and combined new foods; all of these experiences are converted into the youth's new accomplishments. They contribute substantially to a new sense of self and are considered with as much interest as are his neckties, shoes, hair, clothing, etc. They are a similar extension of the self and furnish an equal opportunity for enriching as well as asserting individuality. The ambition to become large, strong, athletic, tall, beautiful, etc., leads both sexes to force the appetite, sometimes to dangerous extremes. This will be discussed in a separate paragraph. Other adolescent traits will appear in the discussion below concerning voracity, daintiness, whims, aversions and the æsthetic appearance of the foods and their setting.

There is not much of very especial value to be said about the fourth and fifth stages in the development of food psychoses. The fourth period begins at mid-adolescence and is marked by (1) a return liking for sweets and acids, (2) the *acquiring of a liking for cooked vegetables*, (3) the decrease in the number of whims and aversions. Meat, potatoes and bread carry over from the other periods. While some cooked vegetables have been accepted in all of the other stages, they were in very general disrepute in the second stage. They became somewhat more acceptable in the third, but not enough to constitute one of its characteristics. In this fourth period they rise in importance enough to surpass the fruits and to become sharp competitors with the meats. Potatoes, tomatoes, corn, beans, peas, sweet-potatoes, turnips, asparagus, spinach, and parsnips are the ones that lead. Lettuce, radishes, celery, onions, pickles, and olives are the most popular among raw vegetables. Many of the foods that had been experimented with in the former period have been accepted and incorporated in a more nearly stable dietary, so that although the range of experimenting has been limited, and a process of elimination has taken place, the individual is more nearly polyphagous than at any previous period. This seems to be the recapitulation of a synthetic period during which man made his adjustments toward becoming an omniverous animal. The return of the craze for

sweets is more characteristic of young women than of young men. The range of accepted sweets is more limited than in the child stage and also more limited than the range of sampled and tested sweets of early adolescence. It settles down into a preference for a few confections, as chocolate and fudge, a few varieties of cake and a few pastries.

The fourth stage enters the fifth through a further constriction in the variety of foods eaten. Many of the sporadic, fugitive and whimsical tastes of early adolescence have run their course and have disappeared. The experimentation and sampling have resulted in the selection of some foods as staples and the rejection of others. This process of weeding out the unfit has gone on through the fourth stage, and in the fifth the individual settles down to the more or less stable dietary of maturity. The permanent disposition of the individual is established and his life work, as a rule, chosen. The chaos of adolescence is over and the permanent physiological habits of life established. The next considerable change that is liable to occur in the general make-up of the dietary is that which inevitably comes with senescence, when there is a tendency to return to the softer, moister and more easily digested foods of childhood together with its sweets. However, there is an increase in the demand for such stimulants as tea and coffee with those who have been accustomed to the use of these drinks.

Voracity. Exercise, the natural demands of a rapidly growing organism, going long without food in general, or for a long time being deprived of a certain kind of food, such as fruit acids and green vegetables during the winter, change of food regimens, change of climate, are among the normal conditions that may cause voracity at any time in life. There are also many pathological conditions that may cause it, *e. g.*, the after effects of diseases like typhoid fever, diphtheria, etc., poor assimilation, some lack in the system, tape-worm. Some cases prompted by a desire to "show off" were reported, and one case was referred to a "vain attempt to satisfy an emotional craving." Although voracity may occur at any age it is much more frequent during the age of adolescence. Eighty per cent. of the 300 cases reported concerned adolescents. The Germans have a saying to the effect that there is a wolf in the stomach of every growing boy. During this period of very rapid growth the appetite is frequently uncontrollable. One growing boy of twelve "ate eight bowls of cereal for breakfast;" another youth after having been out in the fresh air all the afternoon, and having had no supper, ate "one and one-half dozen of fried eggs at twelve o'clock at night and an enormous breakfast at eight next morning;" one girl of fourteen ate an entire bottle of queen olives in an hour; a girl thirteen years old

ate eleven bananas at one time, and a boy sixteen, ate twenty-two; "at a hotel last summer, a thirteen-year-old boy used to order for dinner, soup, fish, two kinds of meat, two kinds of potatoes, all of the vegetables on the *menu*, four desserts, besides nuts and raisins." The effect of voracity upon adolescents are seldom serious. Usually the system at that age is capable of taking care of the enormous quantities of food called for by the keen appetite. Sometimes it is followed by temporary indigestion. If habitual, it usually results in stupidity and coarseness.

Forcing the Appetite. This is a practice which in some form takes hold on almost every one at some time in life. It is practically universal among adolescents. There are, indeed, few boys who do not have a very real desire to become large, strong, handsome and athletic, as there are few girls who do not wish to have a beautiful form and perfect complexion. With many youth this ideal physique is the one consuming desire. Nothing is thought to be organically so intimately connected with its realization as diet and the extremes to which most young people will go scarcely have limits. Among the girls, forcing the appetite for the sake of the complexion is by far more common than for any other reason. Among boys the practice is most often prompted by the desire to gain strength. The things which are eaten for these purposes are, in many instances, foods for which the youth have strong aversions, but which they persist in eating, with a tenacity of purpose that the wisdom of experience alone can remove. Among the things which girls eat for complexion's sake are milk, "great quantities of hot water," lettuce, fruits (particularly strawberries, apples and oranges), onions, tomatoes, chalk, chalk and arsenic. One girl read about a French beauty's daily practice of eating two dozen oranges and taking two tablespoonfuls of powdered sulphur; she followed the suggestion until her health was seriously impaired. Many foods are rejected on account of their reputed effect upon the complexion, *e. g.*, coffee, butter, vinegar, candy, fat meats, nuts and pastries. For the sake of strength the boys eat undue quantities of such things as raw eggs and raw meat; they drink beef-blood, eat rare steaks, cereals, nuts; they drink much water, abstain from vegetables, pastries, ice cream and ices, tobacco, intoxicants, etc., obeying almost religiously the prescriptions of the author of the regimen which they have adopted. Some force the appetite to gain flesh, some to reduce it. The former increase the amount which they eat whether they want it or not, the latter decrease the amount, no matter how ravenous the appetite may be. The former eat foods containing starch and sugar, eat cereals, drink much water and milk. The latter go without one meal a day, sometimes go

without two and sometimes fast for two or three days in succession; they abstain from the starches and fats, eat lemons, vinegar and salt, drink much hot lemonade and some eat slate-pencils. For the general health, Graham bread, whole wheat bread, cereals, fruits, nuts and a strictly vegetarian diet were the things that had been most frequently adopted by those who reported. Carrots had been eaten for the sake of a sweet temper; bread crusts and brown bread to make the hair curl; brown bread and bread crusts to make the teeth white, and bread crumbs to make them long; celery for the nerves; fish and eggs for the brain; cereals and much milk to prolong the life. And all of these people are under the spell of the old myth, somewhat modified, about the fountain of youth and beauty. More than half of the suggestions came down in the form of tradition and hearsay; about forty per cent. came from advertisements, some from foot ball coaches and physical directors, some from physicians, some from quacks and some were original.

Food Aversions. Among the 102 women and 91 men who answered the question concerning food aversions there was not one who did not have one or more of them. There were 498 aversions reported upon, about half of which belonged to those who answered the question and the other half to people whom they had observed. Aversions are liable to be formed at any time in life, but the tabulations of these 498, upon the basis of the time in life at which they were formed, shows that 30 per cent. were formed previous to the period of adolescence, 60 per cent. were formed during adolescence and 10 per cent. after. In accounting for the aversions, some refer the causes to heredity. There is quite a general belief that the aversions which the mother has during pregnancy are transmitted to her offspring. However, these as well as those aversions which run through whole families, may, perhaps very safely, be explained upon the ground of suggestion. The most common cause which was given was that of being made sick by the food. The food may have been the cause or it may have been merely the concomitant of the sickness. In either event the effect is about the same so far as the aversion is concerned. The association between the two is so very strong that the aversion is quite likely to result. The sickness is sometimes caused by gorging; sometimes it is caused by the unwholsome condition of the food when it is served, *e. g.*, one girl was made sick by eating cream-puffs containing sour cream; a man was made sick by rancid butter and the resultant aversion lasted twenty-three years; another was poisoned by eating canned corn, etc., etc. Sometimes, on the other hand, the sickness is caused by the condition of the individual at the time of eating the food,

the system being in no condition to receive it. At adolescence there are some unaccountable revulsions to foods, which, previous to that time may have been wholesome and favorites. A youth of fourteen who had always liked rice, was made sick by a very moderate amount which he ate one morning for breakfast. A strong aversion was developed which he has been trying for twenty years to overcome. He has eaten it in every form of disguise in puddings, stews, soups, etc., with consequent nausea in every instance. Many aversions are caused by an unpleasant odor or taste; by an objectionable shape or color. The range of the association of ideas that can cause aversions to foods is unlimited. It may be an idea associated with taste; *e. g.*, an aversion was formed for red raspberries, in the case of an adolescent boy, "because they taste like bed-bugs smell." It may be an idea associated with appearance of the food; *e. g.*, scrambled eggs, baked Indian pudding, custard, pumpkin pie, salad with mayonnaise dressing were reported for their repulsive suggestion due to their appearance. "Frog's legs suggested to me, the slimy, green animal." Tripe was sickening to one on account of its appearance and where it came from. Kidneys and liver are exceedingly repulsive to some on account of the idea of their functions in the living animal. Oysters are nauseating to others on account of the thought of the animal's intestines. The odor of bananas gave one adolescent girl sick headache and resulted in a deep aversion. Cheeses, rhubarb, and mutton were mentioned as producing aversion on account of their odor. One young woman reported an aversion as due to the fact that the food was touched by a person whom she very much hated. The name "nigger-toes" given to Brazil nuts caused a lasting aversion in an adolescent girl; and a boy who associated blood with blood-oranges could never eat them thereafter. A small girl liked mutton until she saw a lamb alive. Cheese was associated by one young woman with mouse-traps and a "mousy odor." A boy very much enjoyed eating rice until he associated it with Chinamen whom he was told ate rats. Several reported aversions to sausage as due to their associating it with dog and horse meat. Aversions to canned tomatoes were formed by several of both sexes on account of visits to canning factories while this vegetable was being canned. Knowledge of the habits of hogs was repotedr to have turned many against pork. One young lady saw a hog butchered and could never eat hog meat in any form after that. Nurses form aversions to foods which they constantly have to serve to the sick. After having recovered from sickness many people have aversions for the foods which they had to eat while they were sick. The last thing which one eats before becoming sick from any cause is liable to become an object

of aversion, as in the case of a man thirty-five years old, who ate chicken just before he took a severe cold and as a consequence, refused chicken for years afterward. Several reported aversions to jellies because these foods of which they were very fond, had been used to disguise medicines taken during childhood. A young woman formed a lasting aversion to graham crackers because "she was eating them one day on a train when a horrible accident occurred,—a man was run over by the engine." Any unplessant association in connection with a food may be the cause of an aversion. The mind is hypersensitive in regard to unpleasant food experiences. No impressions sink deeper, no memories are more lasting. This has been the salvation of the race in the past in effecting the rejection of foods that were injurious. Even with the amount of accumulated wisdom, and scientific insight which the race has now, this trait is very useful.

The Æsthetic Appearance of Food and its Settings. The replies concerning the æsthetic appearance of food, its color, form, etc., the effect of fine china, beautiful linen, agreeable surroundings, etc., constituted some of the most valuable material that was sent in. All of the women and 93% of the men attach great importance to these things. While the æsthetic appearance of the food, dishes and linen begins to have its effects in childhood, the curve of distinctive appreciation is relatively low until the age of 11 to 15 in girls and 15 to 18 in boys, at which times it rises very rapidly and never goes down. On the contrary it continues to rise with the increased refinement and æsthetic culture that experience should bring. The facts reported indicate that with children under the adolescent age, it is some specific thing that affects them æsthetically. It is a particular color, a symbolic form, a favorite cup, a beautiful gift spoon, etc., that is appreciated for its beauty. Then follows a period of grouping things and emphasizing a particular group. At adolescence it becomes the *ensemble* that is appreciated. Some very interesting comparisons between the sexes appear in the following: 39% of the men and 59% of the women say that the æsthetic appearance of the food and its setting increases the appetite; 12% of the men and 33% of the women say that it improves the taste of the foods; 8% of the men and 4% of the women say that it aids digestion; 18% of the men and 63% of the women say that unæsthetic appearances injure the appetite; 21% of the women and 6% of the men say that very much refinement, elaborate ceremony, etc., with company is so exciting that it impairs the appetite; 12% of the women and 6% of the men say that it exhilarates and makes happy, that they sit longer and eat more. 75% of the men emphasize the value of company over that of the ceremony and

the appearance of the linen, china, etc. With them it is fellowship that is chiefly prized. This fact reverts one's mind to the literal meaning of the word company: *com*, together, and *panis*, bread. Companion, originally meant messmate. 70% of the women, on the other hand, emphasized the ceremony and the beautiful appointment of the dining room above the company. With them it was the elaborate etiquette of the knife, the spoon, the fork, the order of the courses, the proper way, the form, the ceremony which found favor. The company is appreciated chiefly as furnishing the occasion for the graces of the ceremony of the dining room. The following are typical psychical effects of the æsthetics of the dining room that were mentioned. "I enjoy agreeable surroundings and always feel at my best in the presence of enjoyable and unselfish company." "Takes the mind off of what I am eating." "They refine one. Table manners are a sure test of character." "My mind and whole attitude toward things, as well as my appetite are affected by beautiful surroundings." "Makes me feel easy, at home, more agreeable. When the opposite conditions prevail, I become irritable and crawl into my shell, so to speak." "Make me happy, restful and hungry." "Puts one in a good humor." "It gives the mind a feeling of rest." "Has much to do with the character which one develops." "Brings harmony and repose and good humor." "Makes one forget his troubles." "Makes one optimistic, good humored, easily entertained; half of the wit in after dinner speeches is in the stomachs of the listeners."

It was the common impression of both sexes that when out camping, tramping, or upon any free outing, these matters of æsthetic appearance, fine linen, beautiful china, elaborate etiquette, etc., were quite out of place. Plain dress, the open fire, the spider, the spit, plain tinware, the fingers,—absolute freedom from the restraining conventionalities of society, were what were wanted. This taking to the woods is a lapsing back into a simpler, primitive life, and resting upon habits that are much more fundamental and more perfectly automatic,—the older racial eases. As in muscular labor, nothing is so fatiguing as the minute technique which calls into exercise the accessory muscles with their delicacy and nicety of co-ordination, so in the sphere of conduct the minute conventionalities of the well appointed dining room, howsoever automatic they may have become, are relatively late racial acquirements always demanding accompaniment by the mind, and are quite liable to demand mentalization at any moment as any part of a musical symphony on the part of a musical artist who is playing it. Although the activities involved in conventional society have become automatic, they are fatiguing. Tramping, picknicking,

camping, etc. give us rest in the simpler habits that selection and ages of use have shorn of much effort. Nervous leakages, that were caused by the tappings of conventionalized life, are stopped; the appetite becomes ravenous; simple, nutritious food and rest conduce to restoration. Vacations need no more significant justification than this, and any outing that is not such a lapse, cannot be justified upon the basis of rest.

A GLIMPSE AT A NATURE SCHOOL.

By CEPHAS GUILLET, PH. D., Sometime Fellow at Clark University.

In the little Canadian capital, September, 1899, the present writer opened a school in which he might have a free hand in carrying out in practice certain educational ideals which he had formed. It is not the purpose of this article to discuss these ideals[1], but simply to give a brief illustrated account of a part of the work of the school; in which account the principles will sufficiently appear without extended comment.

At this school, then, in the afternoons, books are laid aside, and the boys, whose number is limited to twenty, are so led to a study of their environment, that their best energies both physical and mental may be called forth, and their interest in the wonders and beauties of nature may be made ever keener, more intelligent and more reverent.

The character of the work done varies with the season. In this article a description of fall work only is attempted. Attention is focussed in the autumn upon Mother Earth — the soil, its formation and inhabitants; the sub-soils, their nature and origin; and the rocky crust of the earth.

Outings take up two or three afternoons a week, and sometimes a whole day for more distant expeditions. The other afternoons are spent in two ways: first, in labelling and classifying specimens, in discussing the facts gathered during the outings (in which discussions questions are frequently left to be thought over and decided in future outings), and in making and memorizing topographical and geological maps and charts (of Ottawa, of the district, of the great valley of the St. Lawrence system, of our continent at various geological periods); second, in drawing and coloring leaves, shells, various animals met with in the rambles, etc., both from life and from memory, so as to fix the various forms in the mind. Some of these forms are afterwards conventionalized and used in designs; ideas of artistic beauty having first been developed by a training in drawing, with pencil, crayon and brush, the classical units, and arranging them in patterns after the admirable manner outlined in Mr. Tadd's beautiful work, "New Methods in Education."

[1] For a discussion of these ideals see an article entitled "Recapitulation and Education," *Ped. Sem.*, October, 1900, Vol. VII.

Beginning at the surface of the earth, collections are made of various kinds of soil; of the various leaves of tree and shrub which help to enrich it; of many of the animals that make their home in or upon the soil. Some of these last, such as the toad, salamander and snake, are kept in a vivarium under as natural conditions as possible. Collections are made of the shells of the locality, some of the water-mollusks being kept in an aquarium that their habits may be observed. Both vivarium and aquarium are a perennial source of interest to the boys, most of whom have needed no further suggestion to start similar ones at home. In the fall of 1902 the school collected in its outings some sixty species of snails and bivalves and the boys vied with one another in getting the largest number possible. The two most expert found forty each. The boys have taken great pride in their collections, readily spending their pocket-money to purchase suitable boxes to contain them. One pupil who had lived two years on the Pacific coast said to me one day: "I wish I had known what I know now when I was at S——: I could have got a splendid collection of shells there." That boy's eyes were being opened. Of another boy his parent told me: "He often stands long before our case of sea-shells now; he never used to look at them." In their search for the shells the boys naturally learn much regarding the habits of the "shell-fish."

Then the sub-soils — the shell marl, clays and sands — are studied with a view to understanding their nature and origin. The work done by running water is investigated in this connection. The noble Ottawa, one of the oldest rivers in the world, is a striking illustration of the wonderful erosive power of streams; for, in making its channels it has worn down a deep, broad valley from the Chelsea hills on the north to the great limestone cliff, now crowned with the Canadian parliament buildings, which stubbornly disputes its progress to the south. But the study of the Ottawa itself is led up to by a study of the work of streams large and small which flow into it. Boys naturally love the water and it is easy to turn this feeling into intelligent channels.

In the discussion of the geological facts, the pupils are led to make inferences regarding the history of the earth as recorded in the phenomena observed. There is near a little lake east of Ottawa a sandy cliff twenty feet high topped with a band of marl about two feet thick with the soil immediately above. This band descends in an incline to the present level of the lake. In the marl the boys have found about a dozen species of shells similar to those they have fished out of the lake with living mollusks in them, with the exception of one species which has possibly become extinct. From this the inference is

made by the boys that the top of the cliff was once part of the bottom of the lake, and that the surface of the lake has gradually lowered to its present level. We explore the shores of the lake, paying particular attention to the two little streams that feed it. We follow them up to their sources and examine them with a view to finding the work they do in cutting their channels and in gradually filling the lake with sediment. Going, then, to the outlet of the lake, we find a stream flowing through a gully to the Ottawa River, with a high clay bank on each side. With a little consideration most of the pupils grasp the change that has taken place in the size of the lake and the cause thereof; and the questions they themselves ask me — for example, "Why don't you find marl on this side, too?" — show that they are learning both to observe and to think. When the stream draining the lake is swollen with rain or melting snow, its cutting power is particularly apparent. To assist the slower pupils, I fill three similar bottles with water — one from the lake, one from the stream soon after it issues from the lake, and the third from the stream where it empties into the river. The increasing quantity of sediment in the three bottles demonstrates the work of the stream. The stream has cut its way down through this great field of clay separating the lake from the Ottawa River. This explains the gradual lowering of the lake's surface to its present level. Judging from the present rate of erosion, the marl at the top of the cliff must have been deposited many hundred years ago. In time the lake will be drained so as to leave only the meandering channel of a little creek.

In a brickyard near the Rideau River, where digging is pretty constantly going forward in the blue "Leda" clay, out of which red bricks are made, the boys have found besides some fossil land-plants and a fossil beetle, many marine fossils: — foraminifera, bryozoa, sponge spicules, a piece of a sea-urchin, the tube of a worm, the shells of about a dozen snails and bivalves, opercular valves of barnacles, and a vertebra of a fair-sized fish; and others have found the bones of seals. The boys enter upon this work with real enthusiasm. A lucky find is a source of delight to the finder and of good-humored envy and increased zeal to the others. They frequently stake off claims, which are quite as much respected among the boys as they would be among their elders. One afternoon, while hunting for fossils, a new boy asked me, "Shall we have any school this afternoon?" One of the other boys replied for me: "Why! this is school." "Is this school?" exclaimed the first. "Why! I'd rather do this than play at home!" The boys perceive that the shells of the Leda clay are quite different from any recent shells they have found in the neighborhood and quite

similar to shells which they have brought me from the seashore. A gift-collection is one of the features of the school, the boys bringing home from their vacation-travels many interesting natural history objects, some of which they present to the school. One of the boys brought to the school some shells which his father found in the mud dredged from the bottom of the sea, fifty-seven fathoms deep, off the coast of Newfoundland. One of these, *Macoma calcarea*, we also found in the Leda clay of Ottawa. A drive of a few miles to the east of Ottawa (visiting a sulphur spring on the way) brings us to a little tributary of the Ottawa called Green's Creek, celebrated in Pleistocene geology by the presence in abundance of clay-nodules washed by it out of the Leda clay. Carefully splitting open these nodules, the boys find beautifully preserved specimens of many organic forms, and especially of marine fishes, which are at present found living in the Gulf of St. Lawrence. Naturally all do not display equal interest. The extreme of interest is illustrated by a boy of ten years who took three leather bags and filled all with nodules; so that I felt obliged to carry one for him, another he slung over his shoulder, and the third he dragged sturdily along over the muddy shore. At the other extreme is the unhappy boy who must not get his boots or clothes soiled.

The boys readily reason that this clay in which marine fossils are found is of marine origin, the sediment from an arm of the sea which formerly extended up the St. Lawrence and Ottawa valley. They have been taken also to the Chelsea hills, a part of the Laurentide Mountains, a few miles north of the city, where they have found, in a deposit of "Saxicava" sand four hundred feet above the sea, several fossil shallow-water sea-shells: showing that here was once a beach of that ancient sea. And they are told that away across the St. Lawrence valley, high up in the Adirondacks, are similar remains, showing that the men of those ancient times, thousands of years ago, could have sailed over the sea from the Laurentides to the Adirondacks. This was the Pleistocene age or age of the Flood, and the gradual recession of the waters as the land rose again is marked at various levels by deposits similar to those found at Chelsea. The beautiful story of the Flood, found in our Bible, is recalled in this connection, as well as legends of other peoples, and particularly the Indians, legends which show the indelible impression made upon the human mind by that wonderful catastrophe.

They are also taken to see glacial striæ on the rocks and deposits of boulder clay, which sometimes are well seen when excavations are being made for the foundation of a building; and they are taught something about the work of glaciers in

the past and present. After seeing the glacial markings in one location, one of the boys drew my attention to them another day in a different place, showing that his powers of observation and memory were at work. These glacial remains, together with the boreal character of the fossils in the clay, demonstrate to the boys that the climate during the age of the Flood was colder than at present, and that the higher grounds at least, if not also during part of the time the lower grounds as well, were covered with a glacial ice-sheet or ice-sheets, such as at present occur only in higher latitudes or higher elevations. From which they infer that during the early Pleistocene age the land, far from being flooded, was very much more elevated than at present, though there may have been other causes of refrigeration operating. The striæ of Ottawa prove that the Chelsea hills at least were the seat of a glacier which moved in a southerly direction over the beautiful site of the future capital of Canada.

The boys' attention is next directed to quarries, cliffs and faults, where they may see the solid limestones, sandstones and shales that underlie the marls, sands and clays. They are taught to distinguish the various formations partly by their general appearance, but chiefly by the character of their fossils, specimens of which are collected by each pupil.

With their energy and suggestibility, their collecting instinct, and their spirit of emulation, boys make excellent collectors of natural history objects and their sharp eyes make many an interesting find. To extract fossils from the hard rock requires considerable care, patience, and determination, but I have found these little boys steadily to develop the necessary interest and will-power. To hammer away for ten minutes, or in some instances much longer, striving to undermine a coveted specimen, occasionally having to desist for a time with a rock-splinter in the eye, and then, after all one's efforts, crack the fossil in two at last is very discouraging; but I have often reason to admire the spirit displayed by the boys in such disappointments. When the time comes to go home the majority are always for staying longer, for staying on, indeed, indefinitely. After an outing longer and more arduous than usual, one of the youngest of the boys next day caught cold, due possibly in part to over-fatigue. But the plucky little fellow said "Well, if I am sick, I had a good time anyway." In exceptional cases these outings have sometimes proved too tiring, but as a rule they have had a beneficial effect upon the health and spirits of the boys, as the parents have often testified. In some cases the physical benefit has been very marked.

The training in observation that the boys receive in these outings is evidenced by the many curious things the boys find

and bring me other than those we are specially in search of. They see the larva of the caddis-fly in the water in its garment of tiny sticks: the mud nest of a wasp pasted against the rock; the woolly plant-lice in their pretty fluffy white dresses, clothing the branches of a tree, while many bees hover around; the cone-like gall on the willow; a dead mole on the road; all of which may form and suggest matter for interesting investigation.

To return to our fossiliferous rocks, the pupils readily gather that those stratified rocks are the sediment of an ocean much older than "the Flood," a sediment which has been hardened by pressure and other causes. With the aid of a colored chart of the crust of the earth, the boys are made acquainted with the wonderful succession of geological ages, with their evolving organic forms. Comparing this chart with Dr. Ami's synoptic table of the geological formations about Ottawa, they see that there is a great gap in the record here. As there are no sedimentary rocks of more recent date than the Silurian within several hundred miles of Ottawa, and no trace of the previous existence of such rocks hereabouts, I am able to elicit from the boys by careful questioning that it is probable that no further sedimentary rocks were formed here and that consequently this part of the continent was dry land during the ages that intervened between the Silurian and the Pleistocene. The fossils found in these ancient Cambro-Silurian formations are all seen to be of invertebrate forms of life, — corals, star-fish, worms, crustaceans, mollusks, — showing how primitive life was in that remote age.

Finally, beneath these sedimentary rocks lie the metamorphic rocks of the oldest geological time, known as the Archaean. The city of Ottawa lies not far south of the oldest part of the American continent — namely, the great Laurentian ridge. In their visits, hammer in hand, to various mines in this rugged district, as well as to outcrops in other localities, and to erratics near at hand, the boys are able to make collections of the characteristic rocks and minerals. And from these eruptive rocks, as well as from the folds and faults in the limestones, they learn something of the terrific forces at work in the bowels of the earth. The boys (who range from eight to fourteen years of age) are, I have found, not too young to take a keen and intelligent interest in the matters treated. The parent of one of them — a lad of ten — told me of a lecture in geology his boy had given him in form; a lecture, he said, that contained good information well expressed. All at least gain health, and an attitude of mind that will forever prevent their becoming mere book-learners, while at the same time their interest in books is rendered more keen, intelligent and profitable: something that

mere text-book instruction will never do for children. The boys show their interest in books by using the school library freely, by bringing me books from home on the various subjects treated, and by getting their parents to buy them works on animals, shells, minerals, aquaria.

While it is attempted to cover the whole ground each fall, a part is selected for thorough work. One year it will be recent shells; another, the fossils of the Flood; another, the ancient fossils of the rocks; and another year, rocks and minerals. The views which illustrate this article were all taken this fall (1903). Needless to say, we make constant use of the Geological Museum, which, through the unfailing courtesy of its officers, is a very great help to us.

To read or simply to be told facts and conclusions is one thing; to acquire them in the active, practical way above suggested is another and vastly different thing. The former method has little educational value; the latter must have the highest educational value in the hands of a teacher of tact, resource and reverence — one who, in attempting to decipher with the children the great stone book, has still in mind the words and feelings of the psalmist when he exclaims:

> "How great are thy works, O Lord!
> Thy thoughts are very deep."

For religion is not the denominational thing — the thing of doctrines — that some would still have us narrowly believe. The hope and tendency of the age is quite contrary to such a conception. Neither is religion dependent upon external authority, but upon the individual consciousness. It is a human instinct. The religious spirit is therefore not inconsistent with the scientific spirit, but complementary thereto; and both have their place in every healthful, well-ordered school, as in every sane and well-ordered mind.

As a change from the work of gathering specimens and facts, the boys are sometimes allowed to build bonfires on the shore of river or lake, or to dam streams, or to play in the woods. I shall describe a scouting game which they are very fond of and which we have adapted from the soldiers' game of "spider and fly" recommended by General Baden-Powell in his little book entitled "Aids to Scouting." We play the game in several ways. The boys divide into two bands, one of which, the patrol, is given fifteen minutes or so to hide away somewhere in the woods. Then the other band divides up into parties of two or three or single scouts and set out to find the whereabouts of the patrol. As the scouts approach the patrol, this body must spy them before they are themselves seen; for to be seen is to be captured or killed. It is only necessary to mention the name of the one

seen to effect his capture. Much circumspection and alertness are therefore essential to success at this game. Another way is for the two bands to start, upon a signal, from opposite sides of a wood to reach their opponents' fence or bounds without being seen, for to be seen, again, is to fail and go to the prison-tree. The band getting the most through unobserved wins. Still another way is to post one or two sentries in the middle of the wood, whom the others must pass unseen in going from one side of the wood to the other. Even with regard to merely intellectual capacities, such as observation and judgment, patience and persistence, caution, enterprise and decision, and leaving quite out of account the health and joy of living that should and might always accompany intellectual exertion, I confidently leave it to the reader to judge whether some of the time now almost exclusively given up to greenhouse, bookish instruction might not be well spent even in playing a game.

LITERATURE.

Educational Psychology, by EDWARD L. THORNDIKE. Lemcke and Buechner, New York, 1903. pp. 177.

In a brief preface, Prof. Thorndike roughly classifies psychological knowledge into four parts, namely, the general knowledge about instincts, habits, memory, attention, reasoning, etc., to be found in the ordinary text books; the detailed descriptions of the thoughts, feelings and conduct of children to be found in child-study literature; pedagogical facts; and lastly, the "incoherent mass of facts" about the influence of inheritance, environment and general mental development. To make a "systematic and convenient exposition" of these facts is the aim of the book and the method proposed is that of the psychophysical laboratory which the author applies to the following topics:

The measurement of mental traits,
The distribution of mental traits,
The relationship between mental traits,
Original and acquired traits,
Mental inheritance,
The influence of environment,
The influence of special training upon general abilities,
The influence of selection,
The development of mental traits with age.
Sex differences,
Exceptional children: mental and moral defectives,
The relationship of mental and physical traits,
Broader studies of human nature.

As to the methods themselves, Prof. Thorndike is undoubtedly expert in their use, but psychophysical methods are not new and after all the vast amount of labor and talent which has been expended along these lines of research during the last twenty years, the actual verdict, even in Germany, is that they have not fulfilled the expectations which they, at first, aroused. The reduction of psychology to a quantitative science seems no nearer at hand than a decade or two ago. Even with the advance in methods of dealing with characteristics which do not admit of exact scaling, to which Prof. Karl Pearson has so largely contributed, there are but few mental qualities for which we can find even approximately adequate objective tests. We can, indeed, test the degree of accuracy with which an individual can mark the number of words on a given page containing the letters *a* and *t* or we can test the average ability of a group to do the same thing, and calculate the probability of its approximation to the true average ability, but there is still a question of how much this has added to our knowledge of the mental characteristics of the individual or of the group. For anthropometrical measurements and many anthropological questions, statistical methods are unquestionably in order and productive of valuable results, and whenever exact tests can be formulated which are *real measures* of mental traits or the relationships between them, psychology may profit by them, but unless the tests are real measures, the application of statistical methods gives only the appearance and not the reality of scientific validity. Prof. Thorndike uses as data to illustrate his thesis that accurate measurement of relationship between mental traits is possible the regular marks given by teachers in vari-

ous studies. To reduce such data to a scientific basis, it would be necessary to calculate the probability that any teacher in the group would mark in accordance with the same standard as the other teachers in that group and the probable error due to prejudice in individual cases. It would, moreover, be necessary to arrive at some mathematical estimate of how far the marks represented native ability, good preparation for the line of work required by any particular study, *e. g.*, poor preparation in arithmetic or first-year Latin might seriously cripple the work in Algebra or Cæsar even in the case of bright pupils, — outside helps in preparation of lessons and luck in class, all of which facts will be recognized by teachers as having an important influence on marks. In short, to carry out the system logically, in a matter so complex, would involve us in an infinite series of mathematical calculations, and when Professor Thorndike tells us that "in every section of mental life, in every section of school work there is an easy chance to measure mental relationships," his statement — after the foregoing illustration — fails to carry conviction. Of most of the work which has been done in genetic psychology Prof. Thorndike is severely critical, in some cases rather prematurely, as when he criticises a forthcoming work of Prof. Karl Pearson's on the basis of a preliminary report, two pages in length, published in the Proceedings of the Royal Society. As in this report Prof. Pearson states that it will take several years to finish the collection of data and an additional two or three years will be required for working up the data, it may happen that Prof. Pearson himself will stumble upon some of the points noted by Prof. Thorndike. In some cases, Prof. Thorndike's mathematical bias seems to have somewhat obscured his point of view, as when in Chap. XIV he attempts to apply his measuring rod to distinctively qualitative work and so finds it lacking. In a genetic study of fear, for instance, it may be of value to the psychologist in estimating the importance of his problem to know the percentages of the various fears prevalent among children, but for the psychological study of fear in its origin, development, and effect upon the mental life of the child, it matters little whether fifteen or fifty per cent. of the children reported have these fears. The subject of study is the child who is afraid and the child who is not is, for the time being, relatively unimportant. A physician who is making a study of scarlet fever, studies the children who have the disease and not those who are free from it. Quantitative work can never take the place of qualitative though each may supplement the other, and the chief criticism on Prof. Thorndike's book is that, instead of recognizing this fact and limiting the scope of its problems, it attempts to apply its methods to qualitative work and to measure the incommensurable.

Professional Training of Teachers, by G. W. A. Luckey. The Macmillan Co., New York, 1903. pp. 391.

In this volume Prof. Luckey has compiled a large amount of information in regard to the training of both elementary and secondary teachers in Germany and the United States, and the development of professional training of teachers is traced from the establishment of the first pedagogical seminary by Ratich, in 1619, to the present time. The first chapter is devoted to a brief but concise account of the training of teachers in Germany for both the elementary and secondary schools, the two classes being sharply differentiated. For the elementary schools the practical and industrial side of education receives the greater amount of attention and the Normal schools represent the interests of the common people. Their courses are unsuited to advancement in the higher institutions as their principal features are thorough academic instruction over a limited field by methods suited to guide

the pupil teacher in the work of imparting instruction. The Pedagogical Seminaries for the training of teachers for secondary schools demand a much higher degree of scholarship, at least three years of University training being requisite for admission to most of them. The history of Normal Schools in the United States is given with some detail and the history of the movement toward the professional training of teachers in colleges and universities is outlined. While not in sympathy with class distinctions enforced by the German system, Prof. Luckey is in favor of a limited application of the German principle in the division of elementary and secondary work. A discussion of the diversity of opinion in regard to the training of elementary and secondary teachers is illustrated by the opinions of 108 presidents of State Normal Schools and 52 professors of education in colleges and universities, which Prof. Luckey collected by the questionnaire method, and furnishes an interesting chapter. The difference of opinion in regard to the function of the Normal School as compared with University educational departments emphasizes the need of work along the line of unification of our educational ideals. An appendix of twenty-nine pages gives a complete outline of the courses in the History of Education as offered in the University of Nebraska where Prof. Luckey is located. This contains well selected bibliographies on all the topics contained in the outline. The book as whole will be found a valuable one for reference and will save students along similar lines of research many hours of work. In thus collating so much valuable material Prof. Luckey has rendered a real service to students of education.

Education as Adjustment, by M. V. O'Shea. Longman's, Green and Co., New York, 1903. pp. xiv + 317.

The purpose of the author, as indicated by the title, is to discuss educational problems in their relation to modern scientific thought. Though differing widely in treatment, the fundamental problem of the book is that to which Rousseau devoted himself nearly a century and a half ago in his Emile and, burdened with useless material, artificiality and improbabilities as is the older book there are still many interesting points of comparison. Prof. O'Shea divides his book into three parts, the first of which deals with the present status of education as a science. After discussing the requirements of effective method and briefly summarizing the educational methods of the past and present, the author arrives at the conclusion that the evolutionary point of view is most helpful in the development of education on its scientific side and most serviceable to the teacher.

Part II is a discussion of the meaning and aim of education. Typical educational ideals from the earliest times to the present are reviewed and the great diversity of opinion which exists even to-day is emphasized, though the modern idea, that a human being is acted upon by all the forces of his environment and that his welfare depends upon his mastery of these, is creating a tendency toward more harmonious conceptions. This view leads to a discussion of what is meant by environment, and to the conclusion that environments are not static or permanent in their original forms, but that the spiritual and physical needs of men are the really permanent thing in the adjusting process and that the supreme end of adjustment is the increase of pleasure in its *highest sense* and the diminution of pain. Adjustment in the social organism and its bearing upon education is also discussed and the need of considering the *interests* of pupils to secure the best results in education.

Part III discusses the method of attaining adjustment. The various forms of mental functioning are considered from a genetic point of view as means for securing adjustment and the doctrine of "formal

discipline" in training for efficiency is treated at some length. In conclusion the author cites as a test for educational curricula its efficiency in giving the pupil mastery over his social, intellectual, æsthetic and material environments. For the working out of the details of the educational scheme implied in the foregoing principles, another book is promised and the author gives a rough sketch of his ideas for this. No study is to be pursued for mere formal discipline, and differentiation of studies according to their value to the individual are the chief points in the proposed system. A bibliography of the subjects discussed is appended to the book and will be of value to those who wish to read along these lines. In the preface Prof. O'Shea states that the present volume is the first of a series on education which are already fairly under way and is, to some extent, intended as an introduction to these later volumes. It is, perhaps, for this reason, that the book is somewhat disappointing since the tendency of the reader is to continually look forward to something which is not in the present volume.

The Pedagogical Bible School, by SAMUEL B. HASLETT. Fleming H. Revell Co., 1903. pp. 8 + 383.

The purpose of Dr. Haslett's book is to render the teaching of the Bible more effective by applying to it the educational principles which are now being recognized in all secular training. There is an introduction by Pres. G. Stanley Hall, who, while not agreeing with Dr. Haslett in all points, is in hearty sympathy with the spirit and method of his work. The subject matter of the book is presented in three parts which may be briefly characterized as what has been done, what ought to be done and how to do it. Part I is devoted to a historical account of Bible teaching from the early Hebrew Biblical Schools to the modern Sunday School. Part II is psychological and deals with the periods and stages of individual growth and development, the mental characteristics and needs of childhood and adolesence being discussed in the light of scientific child study and pedagogy. In Part III the psychological principles brought out in the previous discussion are applied to the construction of an outline of the principles and matter which should be employed for children of different ages in the construction of a curriculum adequate for a graded system of instruction. No detailed course of lessons is given but the character of the work suited to each grade is so clearly indicated that lesson plans can readily be constructed from them.

The inadequacy of current Sunday School methods or, in many cases, the lack of any method at all, is so fully recognized by every thoughtful person who is acquainted with Sunday School work that the value of Dr. Haslett's suggestions for reconstruction will be deeply appreciated. Dr. Haslett's book meets a requirement which has long been felt and ought to be read by every one interested in Sunday School work.

The Child's Religious Life, by Rev. WILLIAM GEORGE KOONS. Eaton and Mains, New York, 1903. pp. xii + 264.

The aim of this book is the same as Dr. Haslett's and to a limited extent the plan is somewhat similar, but it is not based upon the thorough historical and psychological research to which the latter has devoted so much time and labor. The author is familiar with some of the recent literature of child study and the psychology of religion and applies some of the principles contained in them to the religious training of children, and so far the book is good. He is, however, frequently more dogmatic than the authors of some of the researches quoted would ever venture to be and the book is marred by serious scientific blunders. The author's personal theological views are stated as if having

the same validity as matters of scientific research and the usefulness of the book is limited to the author's own denomination.

La Vie Normale, Revue d'Etudes Psychologiques, fondée et publiée par le DOCTEUR PAUL VALENTIN, spécialiste des maladies nerveuses et mentales. Première Année. No. 5, Décembre, 1903.

This periodical, which has just completed its first year, is devoted to psychological studies of various kinds but more especially to those which contain pathological elements. The present number contains a psychological study of Alexander Dowie with special reference to his claim to be considered as the prophet Elias; an article on the psychology of education, which is a summary of portions of a recent book by Prof. Guiseppi Sapienza, "Principié di Pedagogia;" a study of Jealousy by Dr. Valentin; and a medical discussion of the character and emotional troubles of hysterics. Each number contains a correspondence department and book notes and reviews. Edited by M. Henri Avenel, 80 Rue Taitboux, Paris. Price, 2 francs per number.

The Right to Life of the Unborn Child. A controversy between Prof. Hector Treub, M. D., Rev. R. Van Oppenray, D. D. S. J., and Prof. Th. M. Vlaming, M. D. Translated by Rev. C. Van der Donckt, New York, 1903. pp. 125.

This little volume is the result of a protest on the part of the famous Dutch gynecologist against the interference of the Roman Catholic church in cases where, in order to save the life of the mother, the life of the unborn child must be sacrificed. The Roman church absolutely forbids any surgical operation which directly sacrifices the life of the child even though it is certain that the life of the child cannot, in any case be saved, and such an operation will preserve the life of the mother. Two of the disputants are Catholics and the question of what instruction shall be given in medical schools in regard to such cases, which are liable to occur in every physician's practice, is involved. Both points of view are ably presented, the humanitarian by Professor Treub, and the Roman Catholic by Dr. Vlaming and Rev. R. Van Oppenray.

Die Seele des Kindes, von Dr. J. A. SIKORSKY. Leipzig, 1902. pp. 80.

This is a collective study of psychic development from earliest infancy to old age, the larger part of the work, however, being devoted to childhood which is treated under two stages: early childhood, covering the period from birth to the sixth year; and later childhood, the period from seven to twelve or fourteen years. The first period of childhood is further sub-divided for study into a discussion of the characteristics of the new-born child and the periods of development during the first three months, the period from the fourth to the tenth month, the end of the first and the beginning of the second to the sixth year. The normal characteristics and development of each period are deduced from the observations of Kussmaul, Schultz Preyer, Genzmer Perez and others and studies of the development of the nervous system made by Flechsig, Goltz and other neurologists and physiologists. The development of taste, smell, tactile, optical and acoustic sensations, attention, feelings and will are discussed in accordance with the observations and experiments of individual investigators. The development of language is treated briefly under association processes. The author has himself collected numerous observations from mothers and other observers and has summarized many of the results of child study in Germany up to the date of publication.

Bulletin de la Société Libre pour l'Étude Psychologique de l'Enfant, No. 10. 3e Année, Janvier, 1903.

The contents of this number are a summarized report of a number of cases of anger collected through a questionnaire; a study of children's ethical ideas as derived from a large number of descriptions by children of what they considered the best action; and a brief but valuable report on the development of language in two little children (sisters) from the age of four months to three years. The salient points of the careful and detailed record kept by the mother, who is a physician, have been included in this summary and their significance brought out by Marie Fuster, the vice-president of the Child Study Association. The various stages of language development are clearly indicated and there is great need of more studies of this character. For students of child study who are not familiar with the Bulletin it will perhaps not be amiss to call attention to one or two studies of the previous year. In the January issue of 1902 there is a brief report by F. Buisson upon children's lies, which is followed in the October number by an interesting study on the same subject by Dr. M. Duprat upon the basis of three hundred cases obtained by a questionnaire. This number also contains a questionnaire study of the effects of scolding and punishment (Etude sur les Enfants grandes), based upon 3,000 returns. All numbers of the Bulletin contain a bibliography of recent publications connected with child study.

L'Hérédité acquise, ses conséquences horticoles, agricoles et médicales, par M. J. COSTANTIN, Paris, 1901. pp. 28.

This is one of the volumes published in the "Scientia" series and in it the author presents a summary of the conflicting views in regard to the inheritance of acquired characteristics. The theories of Darwin, Wallace, Galton, Lamarck and Weismann are discussed and compared and the main arguments for and against the germ plasm theory are presented, as are also the objections urged against the influence of environment. M. Costantin, while fairly presenting the opposing views, holds that acquired characteristics are inherited, basing his conclusions on the experiments of DeVries and studies in disease and vaccinal heredity. The book contains in its foot notes an excellent bibliography of the subject and a birdseye view of the present state of the question in a compact and readable form.

L'Origine dei Fenomeni Psichici e il loro Significato Biologica, GUISEPPI SERGI, 2a. Edizione riveduta e aumento con figure nel testo. Fratelli Bocca, Editori, Torino, 1904. pp. 367.

The author, who is Professor of Anthropology at the Royal University at Rome, has in this volume elaborated his theory of the origin of psychic phenomena. Starting with the conclusions of Claude Bernard (1878) that irritability is a primordial characteristic of protoplasm in both plants and animals and that it has in itself no power of initiating movement but requires excitation exterior to itself, he goes on to develop the whole of psychic life from this primitive characteristic of irritability. Since Bernard found reaction to stimulus and suspension of function by the use of anæsthetics, occurred in both the higher and the lower forms of life, Prof. Sergi concludes that irritability and sensibility are identical. This sensibility has two grades, the simple irritability, which is the primitive characteristic of organic matter, and conscious sensibility which is a specific function of nerve cells and fibres. From an examination of organisms from the most elementary to the most complex, and the facts of embryology, especially those observed in animals inferior to man, he con-

cludes that "there is a single origin for all cellular tissue and a single origin for every function; that dissimilarity of tissue is derived by evolution from a single living element, namely protoplasm, and therefore differentiation of function is a phenomenon concomitant with morphological evolution, in short, that the nerve element is derived from undifferentiated protoplasm and its function, from the lowest to the highest form, is a functional differentiation from primitive irritability." Since Prof. Sergi thus regards sensibility as a purely biological function, he would reject the ordinary classification of phenomena of life into physical and psychic and substitute a division into functions of nutrition and functions of relation. Under nutrition are included all *internal* functions, nutrition, circulation, secretion, digestion, etc., and under functions of relation, sensibility and movement, *i. e.*, the *external* relations. From primitive irritability, movement is developed as a function of protection, but movement alone is insufficient for protection and along with it perception is evolved as a higher development of sensibility. Memory, in turn, is not to be regarded as a distinct phenomenon by itself but as a continuation of perception. Both constitute a phenomenon which is derived from the impressibility of the nervous substance and which has for its function the defence and protection of the individual and the species. The dawn of consciousness, though it cannot be definitely located in any particular animal, is probably to be found among the metazoa, which have scattered nerve elements but no central ganglia. This rudimentary consciousness is probably local and confined to special areas.

In a chapter on Heredity, Professor Sergi dismisses the theories of Darwin, Wallace, and Weismann as involving an unnecessary and mythical element whether under the name of gemmule, germ, or germ plasm,—since, according to his view, the principle of the conservation of energy sufficiently explains the stability of types. Variations and the formation of new species are due to the action of environment and these variations are found even in unicellular organisms. In accordance with this theory, any acquired characteristic which becomes useful to the individual or the species may be inherited.

The value of the psychic function as a factor in evolution and its significance in the struggle for existence is discussed in relation to five series of facts as they occur in the animal series and in man. These five orders of facts are nutrition, defense, sexual relations, parental relations and social relations, and their dependence upon the psychic life is illustrated by copious examples from animal life and from anthropology. In the development of the psychic life as a function of protection, Prof. Sergi finds one abnormality and wide-spread pathological illusion. This is *religion*, which he regards as a noxious plant which has hindered scientific progress. He is not here speaking of those religious phenomena which are ordinarily recognized as pathological, but of all religions from the lowest to the highest. His argument is, briefly: Religion has its origin in fear, its earliest form being probably ancestor worship in which the essential idea was to obtain immunity from harm or favors from the spirits of the dead. It is pathological because it does not attain its aim of protection, and because it is an appeal to that which does not exist. The main argument of Professor Sergi's book is that the psychic life is a vital function differing in no respect in its origin from any other biological activity. Its sole function is the protection of the individual and the species, which becomes increasingly efficient as we ascend in the scale of life and with the progress of science, but the progress has been hindered by the almost universal delusion of religion "which is a pathological perversion of the true function of protection. That the protection of man as an individual and as a species, singly or collectively, comes only from man

and apart from him there exists no means of protection" is an inevitable conclusion from his course of reasoning.

The fundamental assumptions upon which Professor Sergi bases his whole theory are the unity of protoplasm, its property of irritability and that it does not possess within itself the power of initiating movement. The biological authorities chiefly quoted are Nagaeli (work published in 1865), Haeckel (1862-1866) and Bernard (1878). Among the biologists of the present decade, it would probably be difficult to find one who would be willing to commit himself unreservedly to either of the statements upon which Professor Sergi bases his theory. Certainly it is very far from being proven that protoplasmic movements are due to any external stimulus. But though quoting freely from the scientists whose dates have been given above, Prof. Sergi makes no mention of the studies in protaplasm made during the last twenty years by such scientists as Strassburger (1882), Leydig (1885), Quincke (1888), Verworn (1892), Hertwig (1892), Butschli (1894), Wilson (1896), and the interesting work of Mrs. Andrews (1896-1897), and yet it is upon the conclusions of such specialists as these that the validity of his fundamental propositions depends. His theory of religion is so clearly affected by his personal animus against the Roman Church that it can hardly be seriously considered from a scientific point of view. In its fundamental assumption of the non-existence of a protective power, it logically begs the question, and even from Prof. Sergi's own point of view it is not in logical accord with the rest of his system since both from the sociological and biological points of view a very good case could be made out for religion as a protective function.

THEODATE L. SMITH.

Aus den flegeljahren der Menschheit, von LEO FROBENIUS. Gebrüder Jänecke, Hannover, 1901. pp. 416.

When the author of this book was thirteen years old he had read a great many stories of animals, frontier life and adventure, and, being a nephew of the keeper of the zoölogical gardens, had long been familiar with the animals there. The books and the animals did not agree and he gathered the former up and took them to a second-hand store to sell, demanding real books about savages. He was told that what he wanted did not exist for boys, and now, in his mature years, he has decided that this intense desire of childhood and youth to know primitive people shall be gratified, and so he has written this very interesting book, illustrated by over four hundred cuts and containing the following chapters: decorations of men; tattooing; tests of manhood; the origin of work; symbol language; sign language; drum language; the drum and dance; picture script and ornament; animal legends; funeral ceremonies in Africa; the ghost; the skull cults and head hunters; ancestor cult and fetishism; the secret societies and masks; the mide; sacred animals; the flight of the souls of the dead; the collapse of the gods; a typical sun god; the solar pathway; men upon the path of the sun; the cunning spider; the origin of the world, collapse of the heavens and the flood; the theft of fire; the fire cult; the discovery of fire; the stone age; the iron age; the primitive history of war; cannibalism; fighters.

No such book exists in English, but there can be no doubt that the author has here created a new pedagogic implement which appeals with amazing power to youth and which would be a useful supplement to geography and perhaps to literature. It has always seemed anomalous and a little monstrous that anthropology has so slight an academic representation in this country and that the young are compelled to gratify their proclivities for savagery by reading the cheapest and falsest penny dreadfuls, many of which ought to be suppressed by

a law. This work is essentially an introduction to the study of savage and barbarous life the world over.

The Moon, by WILLIAM H. PICKERING. Doubleday, Page & Co., New York, 1903. pp. 102.

This is a summary of the existing knowledge of the moon with a complete photographic atlas and one hundred illustrations, made by the man perhaps of all others most competent from long special studies. He has here résuméd our knowledge of the moon up to date, without technical language or mathematics, but in a way which every intelligent reader can understand. It is a book that ought to be accessible to every high school student in the land, and the even cursory reading of it would be of more real value to such students than is likely to be conveyed by any other high school course known to the writer. It is to be hoped that this work may be supplemented by one about the sun and perhaps yet another about the planets of our system, although it is doubtful if either could be made as interesting and really educational. It is to be hoped that such a book as this and the two manuals of Professor Todd may contribute to rescue astronomy, which is not only the oldest science but the first in the history of education to be established in our curriculum, from its present pedagogic degradation and oblivion.

Psychologists may now demand what could be written, namely, a complementary work on the moon and its effects on the life and soul of man, including its myths, the periodicity with which it has stamped both sexes, its relations to insanity and to many other psychic phenomena which have been lately brought to light in the studies of Kairn, Koester, Swoboda, and others. The religious and poetic reactions of the race to the moon or the moon in literature and history, would constitute another interesting chapter in such a work and would help rescue psychology from its scholastic swathing bands and take it out of doors and bring it into contact with life.

Hundert Psychologische Schulverauche mit Augabe der Apparate, von DR. ALOIS HOFLER and DR. STEPHAN WITASIK. Johann Ambrosius Barth, Leipzig, 1903. pp. 44.

These hundred experiments devised for school use are based to some extent upon Professor Sanford's text book of laboratory psychology. They include tests for the ear, eye, the latter with a number of illusions, the thermal sense, touch, the psychophysic law, the compound sensations, and a number of interesting puzzles are introduced. Simple tests are included for association, memory, judgment, attention, unconscious psychic processes, direct and crossed, after images and various binocular effects, the judgments and illusions of time and motion, the effects of emotion upon blood pressure, simple æsthetic impressions, reflex and automatic movements, judgments of weight and size, and speech movements. In an appendix a list of all the apparatus required to conduct these experiments is given, seventy-three pieces in all, with the cost of each. In general these are inexpensive, the tuning forks, apparatus for reaction time, being the most costly. All can be purchased in a lot from a single dealer.

Influence de l'éducation sur le developpement de la neurasthénie, par MLLE. JADWIGA SZEJKO. A. Rey & Cie, Lyon, 1902. pp. 629.

This is a thesis of unusual value which goes over the whole subject of neurasthenia in its relations to heredity, school, fear, attention, will, suggestibility, music, habit, alcoholism. The four predisposing factors he considers to be school work under unfavorable conditions, wrong moral control including the excesses of both rigor and license,

inadequate development of the higher psychic faculties by culture, exaggeration of the lower emotive, automatic, suggestible faculties and defective or perverted activities.

The Policy and Administration of the Dutch in Java, by CLIVE DAY. The Macmillan Co., New York, 1904. pp. 434.

Java is the most important dependency of the Dutch, whose colonial system differs quite radically from that of England. In this careful survey the author includes a brief account of the native organization, compares Java under the East Indian Company and after its fall, giving the story of British rule of the Dutch Restoration. He then describes the culture system, its policy, government, reforms, in economic, fiscal, and other aspects. It is a book of great interest, abounds in compact and well digested information.

Notes on Oriental Babies, by EDITH ELMER WOOD. American Anthropologist, Vol. V, No. 4, October-December, 1903. The New Era Printing Co., Lancaster, Pa., 1903. pp 000.

The author took a number of observations which show a marked difference between the oriental and the occidental type of baby. Perhaps the most remarkable is the precocity of the Chinese in six-year-old molars. The time of the appearance of the first incisors, the milk teeth, is late, but once begun, it goes on very rapidly. The feet of the Chinese do not indicate that their long habit of compression has yet produced any hereditary results. Perhaps the spine is a little longer than that of occidental children. The skull, at least of the Japanese, appears to be somewhat larger.

A Handbook of Modern Japan, by ERNEST W. CLEMENT. A. C. McClurg & Co., Chicago, 1903. pp. 395.

This compact little work attempts a very comprehensive survey of Japan, physiographic, industrial, historical, legal, constitutional, æsthetic, educational and religious. He describes modes of transportation, the life, food, dress, of the people, their traits and customs, the new woman in Japan, its language, the disestablishment of Shinto, Japanese Christendom, twentieth century Japan, and the mission of Japan.

State Aid to Secondary Schools, by DAVID RHYS JONES. The Univ. Press, Berkeley, 1903. pp. 148.

This monograph from Vol. III of the University of California publications in education gives a history of State aid to secondary schools from the colonial period to the year 1903, together with an account of the systems of extending such aid at the present time in all the States that have taken advanced ground in this matter. This is a valuable monograph.

The Man Who Pleases and the Woman Who Charms, by JOHN A. CONE. Hinds & Noble, New York, 1903. pp. 141. Price, 75 cents.

This is a bright, chatty work on amenities, with chapters on conversation, the compliment of attention, voice, manners, dress, personal peculiarities, etc. The author brings wide general reading to bear, and while his work abounds in quotations, it is fresh, original and suggestive.

Proceedings of the Massachusetts Historical Society. Second Series, Vol. XXII. Boston, 1903. pp. 548.

This volume contains a lengthy article by G. S. Hall on the relations of civilization to savagery.

A Modern School, by PAUL H. HANUS. The Macmillan Co., New York, 1904. pp. 306.

Professor Hanus here sets forth in nine chapters the educational faith that is in him. He has thought and taught long in the field of pedagogy and his book is an important landmark and will be welcomed by all interested in education. Although a number of the papers have appeared elsewhere within the last four or five years, it is essentially a new book that he offers us. The chapters are as follows: A Modern School; The Academy and the Public High School; Two Contemporary Problems in Education; a Six-year High School Programme; The School and the Home; Our Faith in Education; Obstacles to Educational Progress; Education as a University Study and the Professional Training of College-bred Teachers; Graduate Testimony on the Elective System.

The Educational Theory of Immanuel Kant. Translated and edited with an introduction by Edward Franklin Buchner. J. B. Lippincott Company, Philadelphia, 1904. pp. 309.

We have here a translation of one of the greatest pedagogic classics with various footnotes and appended selections which attempt to bring together all the material which Kant has to offer upon the general theme of education. It is certainly no easy matter to put into good English the crabbed, broken style of this philosopher, but we can only congratulate the author upon his success. His book will be a permanent addition of great value to the rich and growing educational literature now accessible in English.

The Philosophy and Psychology of the Kindergarten. Teachers College Record, November, 1903, Vol. IV, No. 5. Columbia University Press, 1903. pp. 76.

This is a valuable contribution by J. A. MacVannel with appended notes on psychology for kindergartners by E. L. Thorndike. For ourselves we wish the first part of the work was less abstract and the second less inchoate. Like most of the other writings of this latter author, there is abundant suggestiveness, but the great carelessness and disorder of one who writes too much and too loosely. Many of the very best books on the subject are omitted in his references and others almost entirely irrelevant are introduced. Why the scrappy quotations from the kindergarten magazine are introduced with the list of things that can be obtained from a certain manufacturer "for the small sum of twenty-five cents," it is difficult to see, as it is why the author should so often repeat what he has said before and mix in so much that is platitudinous. The writer of this note has a higher idea of the intellect of teachers than that which appears to be held by this author.

Primitive Woman as Poet, by ALEXANDER F. CHAMBERLAIN. The Journal of American Folk-Lore, Vol. XVI, No. 63. October-December, 1903. Houghton, Mifflin & Co., Boston, 1903. pp. 205-221.

This article is a very interesting collection of facts from all lands, ages and races, illustrating the propensity of woman not only to love but to create poetry and song. In this respect women are thought to have been perhaps creative to a greater extent and earlier in time than men. An old Bulgarian woman carried two hundred and seventy folk songs, and a young girl one hundred and fifty in her memory. Nurses, sibyls, the ancient and modern Sapphos and Boadiceas, the story of Phillis Wheatley, dance songs, lullabies, cooing and wooing, ballads,

incantations, and many other things to which no note can do justice, abundantly illustrate Professor O. T. Mason's idea that woman is and has been not only the conservator and teacher of religion but also of poetry.

The President's Report. Administration. The Decennial Publications of the University of Chicago. Volume I. Univ. of Chicago Press, Chicago, 1903. The President's Report, pp. xi-cxliii. Reports of the Deans, Directors and Laboratories, pp. 1-467. Reports of Other Officers, pp. 469-491. Historical Sketch, pp. 493-574.

This large and elegant volume is almost a model of its kind. President Harper leads all others in this country or any other in frankness and fullness of statement. The history of the different departments of the University and of the great questions that have been considered is given with admirable fullness. The University of Chicago has, from the first, felt that a new institution should make new departures which older institutions, more settled in their conservatism, cannot make. This it has done in all directions. Most of what may be called its experiments have been eminently successful. There have been some errors and failures and these are frankly and fully stated. In each of the score of departments and topics the President's report ends with series of recommendations for the future based on the experience of ten years. We, in New England, always look with interest to President Eliot's annual report and always find a few interesting points ably treated. The report of President Harper, however, is franker, fuller, far richer in new topics and suggestive treatment of them. Indeed, it is probably not too much to say that no document on the higher education has ever been published in this country which equals this in value and suggestiveness. This we are glad to say although there are some points and recommendations with which we cannot agree and other propositions that to our mind are unconvincing, but for the courageous and able talk of new problems for adaptation to new educational conditions there can be no doubt but that this institution and this report will be more and more regarded, as the years go by, as nothing less than epoch making.

Das Seelenleben des Kindes, von DR. KARL GROOS. Reuther & Reichard, Berlin, 1904. pp. 229.

This tasteful little volume is divided into two parts; first the general, attempting to define the problems, methods, divisions, the distinctions between heredity and acquired reaction and the relations of the study to play as the child's natural method of self evolution, and the second larger and more special part. The latter is sub-divided into reproduction and its effects and discusses association, learning and forgeting, delusions of memory, combinatory fantasy, apprehension and apperception, recognition and illusion. The second sub-division treats of knowing under the three sections, idea, judgment and conclusion. The author's study of animals was certainly a good preparation for this work. Despite the somewhat schematic, not to say scholastic, division of his subject, the author shows great familiarity with the American work and makes large use of it, although he often lays stress upon sections of it that seem, on this side of the water, of slight importance. The work is, in a sense, provisional and no general conclusions of great importance are attempted, the form of academic lectures being mainly preserved.

The Boys' Round Table, by WILLIAM BYRON FORBUSH. Men of Tomorrow Co., Albany, N. Y., 1903. pp. 49.

We have an interesting account of a very interesting order devised

by its author which, at least theoretically, and from this book, we judge, practically, must be one of the very best of the social methods of promoting virtue.

Demosthenes on the Crown. Edited by William Watson Goodwin. The Macmillan Co., New York, 1904. pp. 296. Price, $1.10.

This addition is not only admirable in type and paper but contains all that its distinguished editor can do to make this immortal oration intelligible and give an adequate setting.

A Century of Expansion, by WILLIS FLETCHER JOHNSON. The Macmillan Co., New York, 1903. pp. 316.

This is an admirable history of the development of our country from the western edge of the Atlantic to the Pacific, describing all the new accessions of territory.

Die Erdkunde. Völkerkunde, von HEINRICH SCHURTZ. Franz Deuticke, Leipzig, 1903. pp. 178.

This is a long desired hand-book covering the ground of physical anthropogeography, speech, society, economy, culture, religion, the various ethnic groups, etc. Its great defect, however, is almost complete lack of references. It is illustrated.

Elementary Guide to Literary Criticism, by F. V. A. PAINTER. Ginn & Co., Boston, 1903. pp. 195. Price, 90 cents.

The author first describes the nature and forms of criticism and some fundamental æsthetic principles, then passes to the rhetorical elements, words, sentence, paragraph, figures, style, and then describes the kinds of literature.

The First Three Books of Homer's Iliad, by THOMAS D. SEYMOUR. Ginn & Co., Boston, 1903. pp. 138. Price, $1.25.

This edition is a model textbook with illustrations, notes, maps, lexicon, and everything necessary and complete in itself.

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